PRICE $1.

450

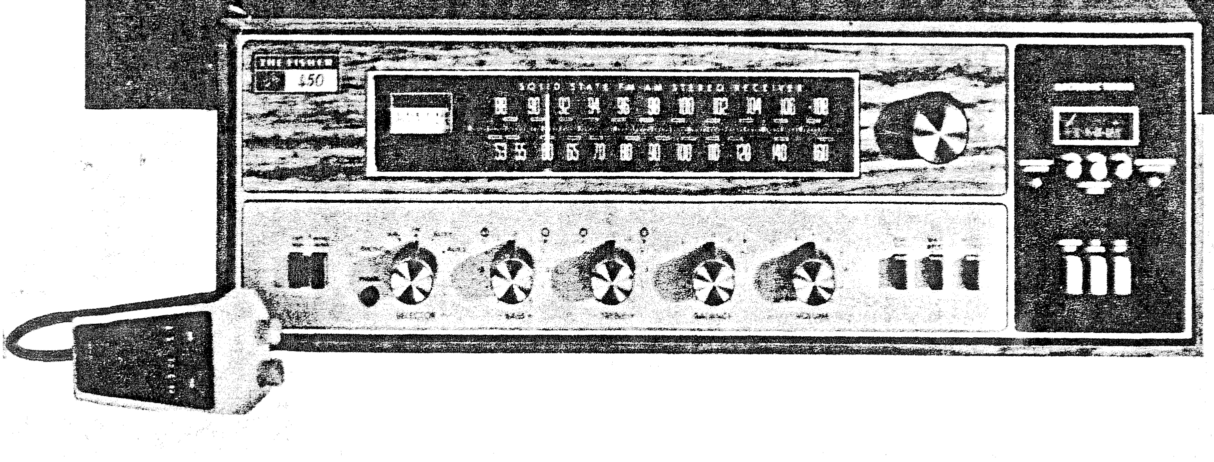
SERIAL NUM
BEGINNING 1

SERVICE MANUAL

The Fisher®

450-T™

= 505.


THE FISHER
450
SOLID STATE FM-AM STEREO RECEIVER

WORLD LEADER IN HIGH QUALITY STEREO

2

TEST EQUIPMENT AND SERVICE TIPS

The following equipment is required to completely test and align modern high-fidelity amplifiers, tuners, and receivers.

- Line Voltage Autotransformer or Voltage Regulator
- DC Vacuum Tube Voltohmmeter
- Accurately Calibrated AC Vacuum Tube Voltmeter
- Oscilloscope ((Flat to 100 kHz Minimum)
- Low-Distortion Audio (Sine Wave) Generator
- Intermodulation Distortion Analyzer
- Harmonic Distortion Analyzer
- 2 – Load resistors, 8-Ohms, 100 Watt (Minimum Rating)
- AM/FM Signal Generator
- 10.7 MHz Sweep Generator
- Multiplex Generator (preferably with RF output)
- 455 kHz Sweep Generator
- Ferrite Test Loop Stick
- 2 – Full Range Speakers for Listening Tests
- Stereo Source – Turntable, Tape Recorder, etc.
- Soldering Iron with Small Tip, Fully Insulated from AC Line
- Suction Desoldering Tool

CAUTION: This precision high-fidelity instrument should be serviced only by qualified personnel, trained in the repair of transistor equipment and printed circuitry.

Many of these items are included only as a reminder – they are normal procedures for experienced technicians. Shortcuts may be taken, but these often cause additional damage to transistors, circuit components, or printed circuit boards.

SOLDERING: A well-tinned, hot, clean soldering iron tip will make soldering easier, without causing damage to the printed circuit board or the components mounted on it. Regular use of a sponge cleaner will maintain a clean soldering surface. The heat available at the tip, (not the wattage of the iron) is important. Some 50-watt irons reach temperatures of $1,000^{\circ}$ F, while others will hardly melt solder. Small-diameter tips should be used for single solder connections, pyramid and chisel tips for large areas.

Always disconnect the AC power cord from the line when soldering. Turning the power switch OFF is not sufficient. Power-line leakage paths, through the heating element of the iron, may destroy transistors.

PARTS REMOVAL: If a part is not being returned for in-warranty factory replacement, it may be cut in half (with diagonal cutting pliers) to make removal easier. Multiple terminal parts, such as IF transformers, or electrolytic capacitors, should be removed using special de-soldering tips made especially for this purpose. Removing solder from terminals, reduces the possibility of breaking the printed circuit board when the part is removed.

ACCIDENTAL SHORTS: A clean working area, free of metal particles, screws, etc., is an important preventive in avoiding servicing problems. Screws, removed from the chassis during servicing, should be stored in a box until needed. While a set is operating, it takes only an instant for a base-to-collector short to destroy a transistor (and others direct-coupled to it). In the time it takes for a dropped machine screw, washer, or screwdriver, to contact a pair of socket terminals (or terminal and chassis), a transistor can be ruined.

SOLID-STATE DEVICES: Integrated Circuits contain the equivalent of many circuit parts, including transistors, diodes, resistors, and capacitors. The preferred troubleshooting procedure requires isolating the trouble to one stage using AC signal tracing methods. Once the suspected stage is located, the DC voltages at the input and output leads are measured to give an accurate indication of the operating conditions of the IC. DO NOT use an ohmmeter to check continuity with the IC mounted on the printed circuit board. Forward biasing the internal junctions within the IC may burn out the transistors. Do not replace a defective IC until all external resistors, capacitors, and transformers are checked first, to prevent the replacement IC from failing immediately due to a defect in the connecting components. Solder and unsolder each lead separately using a pliers or other heat sink on the lead to prevent damage from excessive heat. Check that the leads are connected to the correct locations on the printed circuit board before turning the set on.

Whenever possible, a transistor tester should be used to determine the condition of a transistor or diode. Ohmmeter checks do not provide conclusive data, and may even destroy the junction(s) within the device.

Never attempt to repair a transistor power amplifier module until the power supply filter-capacitors are fully discharged.

If an output or driver transistor becomes defective (opens or shorts), always check ALL direct-coupled transistors and diodes in that channel. In addition, check the bias pot., and other parts in the bias network, before installing replacement transistors. All output and driver transistors in one channel may be destroyed if the bias network is defective. After parts replacement, always check the bias adjustment for specified idling current.

In some applications, replacement of transistors must be made from the same beta group as the original type. The beta group is indicated by a colored marking on the transistor. Be sure to include this information when ordering replacement transistors.

When mounting a replacement power transistor, be sure the bottom of the flange, mica insulator, and the surface of the heat sink, are free of foreign matter. Dust and grit will prevent flat contact, reducing heat transfer to the heat sink. Metallic particles can puncture the insulator, cause a short, and destroy the transistor.

Silicone grease must be used between the transistor and the mica insulator, and between the mica and the heat sink, for best heat transfer. Use Dow-Corning DC-3, or an equivalent compound made for power transistor heat conduction.

Use care when making connections to speakers and output terminals. To reduce the possibility of shorts, lugs should be used on the exposed ends, or stranded wire should be tinned to prevent frayed wire ends. Current in the speakers and output circuitry is quite high – poor contacts, or small sized wire, can cause significant power losses in the system. For wire lengths greater than 30 feet, 16 AWG, or heavier, should be used.

VOLTAGE MEASUREMENTS: All voltages are measured with the line voltage adjusted to 120 volts. All measured voltages are ±10%. DC voltages are measured to ground with a VTVM, with no signal input unless otherwise noted. AC signal voltages are measured under the conditions specified on the schematic.

ALIGNMENT PROCEDURES: DO NOT attempt realignment unless the required test equipment is available, and the alignment procedure is thoroughly understood.

BECAUSE ITS PRODUCTS ARE SUBJECT TO CONTINUOUS IMPROVEMENT, FISHER RADIO RESERVES THE RIGHT TO MODIFY ANY DESIGN OR SPECIFICATION WITHOUT NOTICE AND WITHOUT INCURRING ANY OBLIGATION.

MECHANICAL DISASSEMBLY

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REMOVING DRESS PANEL

(1) Remove the five screws securing top cover to chassis and heat sink. Remove cover.
(2) Remove the two AUTOSCAN meter leads from pins R9 and Q9. Label each lead for reference.
(3) Gently pull SELECTOR, BASS, TREBLE, BALANCE, VOLUME, and TUNING knobs from control shafts. Remove hex nuts from shafts and remove panel.
(4) Reverse procedure for reassembly.

REPLACING DIAL GLASS

(1) Remove dress panel. Refer to REMOVING DRESS PANEL procedure.
(2) Loosen the four retaining screws, and rotate retainers. Remove dial glass.
(3) Reverse procedure for reassembly.

REPLACING DIAL LAMPS

(1) Remove dress panel. Refer to REMOVING DRESS PANEL procedure.
(2) Snap out defective lamp from spring clip. Place new lamp (FR No. I21B406-1) into clip so that unpainted side of lamp faces edge of dial glass.
(3) Replace dress panel.

REPLACING STEREO BEACON AND METER LAMPS

NOTE: The lamp assembly on rear of tuning meter contains the meter lamp and STEREO BEACON lamp, and must be replaced as a complete unit.
(1) Remove the five screws securing top cover to chassis and heat sink. Remove cover.
(2) Gently pull the four wires from terminal pins on top rear of tuning meter. Label each wire for reference.
(3) Gently unsnap lamp assembly from top rear of meter. Center replacement assembly (FR No. M21C604-2) between flanges and press firmly in place.
(4) Reconnect the four wires to their associated terminal pins on replacement assembly. Replace cover.

REPLACING AUTOSCAN LAMP

(1) Remove the five screws securing top cover to chassis and heat sink. Remove cover.
(2) Squeeze edges of molded lamp assembly and pull through bracket.
(3) Disconnect leads and label for reference.
(4) Snap in replacement lamp assembly (FR No. AS21410-4) and connect leads. Replace cover.

REPLACING TUNING METER

(1) Remove the five screws securing top cover to chassis and heat sink. Remove cover.
(2) Gently unsnap lamp assembly from top rear of meter. Pull assembly away from meter but do not disconnect leads.
(3) Gently pry meter off back of dial panel, and scrape residual adhesive from panel. Disconnect meter leads and label for reference.
(4) Peel backing from one side of replacement adhesive mounting pad (FR No. E51A219), and affix it to replacement meter (FR No. M21C604-1). Peel backing from remaining side of pad, align meter face over panel cutout, and firmly press meter to back of panel.
(5) Center lamp assembly between flanges on meter back, and press firmly in place. Connect meter leads.
(6) Check meter calibration. Refer to FM ALIGNMENT procedure. Replace cover.

REPLACING AUTOSCAN METER

(1) Remove the five screws securing top cover to chassis and heat sink. Remove cover.
(2) Remove meter leads from pins R9 and Q9. Label each lead for reference.
(3) Gently pry meter off back of dress panel, and scrape residual adhesive from panel.
(4) Peel backing from one side of replacement adhesive mounting pad (FR No. EM51293), and affix it to replacement meter (FR No. MC21610). Peel backing from remaining side of pad, align meter face over panel cutout, and firmly press meter to back of panel.
(5) Connect meter leads. Replace cover.

REMOVING P. C. BOARDS

To remove board from nylon mounts, squeeze loop of mounting clip (using pliers), and lift each corner of board. To remount board, align mounting holes over clips, and press firmly.
To remove any board containing front-panel controls and switches, use the following procedure:
(1) Remove dress panel. Refer to REMOVING DRESS PANEL procedure.
(2) Remove the five screws securing bottom cover to chassis. Remove cover.
(3) a. Remove CONTROL AMPLIFIER board by removing hex nuts from BASS, TREBLE, BALANCE and VOLUME controls.
b. Remove PUSHBUTTON-SWITCH boards by removing the two screws holding each switch to chassis. Three additional screws must be removed from MODE/MONITOR board.

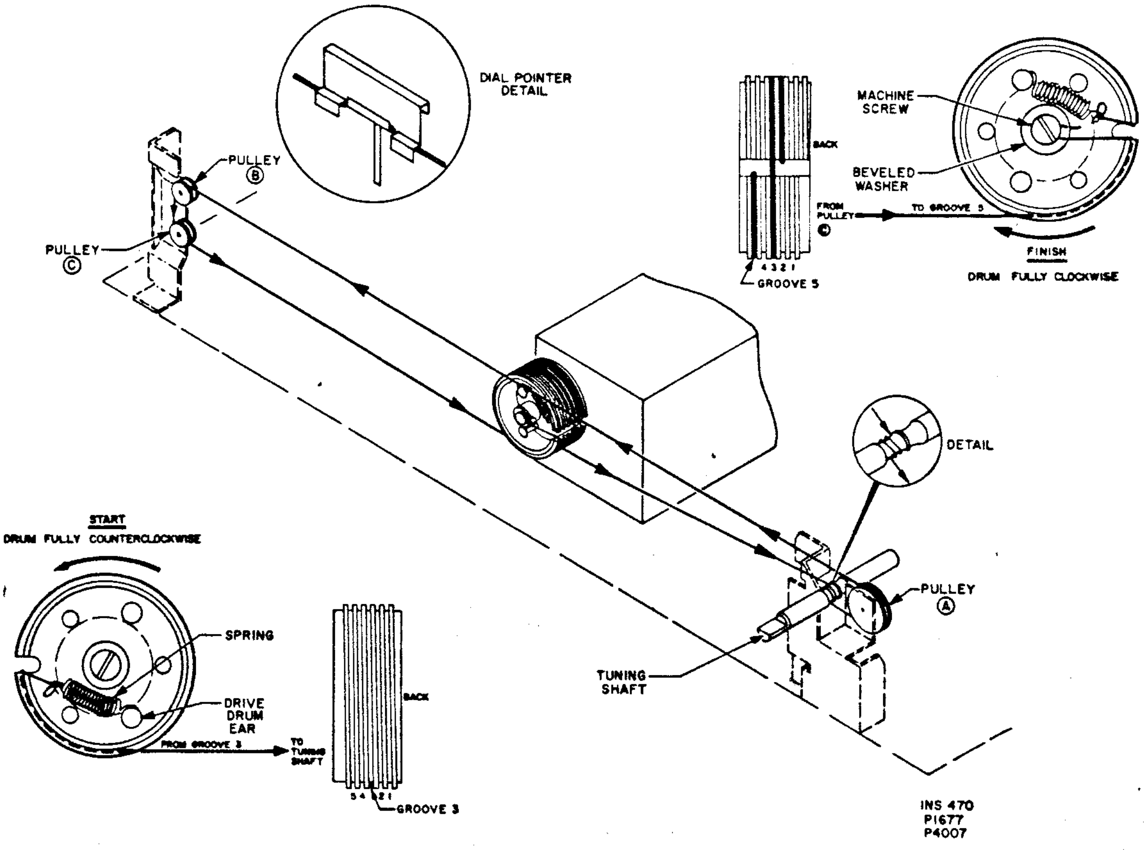
DIAL STRINGING

(1) Remove screws securing top and bottom covers to chassis and heat sink. Remove covers. Remove pointer.
(2) Rotate tuning capacitor fully CCW. Loosen screw in center of drum and remove old dial cord.
(3) Tie end of new cord to end of dial spring. Fasten spring to bottom right ear inside drum. See illustration.
(4) Run cord through rim slot into underside of groove 3.
(5) Pull cord taut and wrap 2 turns CCW around tuning shaft. See detail.
(6) Guide cord under and around pulley "A", and around pulleys "B" and "C". Keep cord taut.
(7) Rotate drum fully CW, allowing cord to wind onto drum.
(8) Guide cord under drum into groove 5, through rim slot, and under washer.
(9) Pull cord taut, and tighten screw.
(10) Rotate drum CCW and CW to distribute tensioning.
(11) Repeat steps (9) and (10) until spring is tensioned.
(12) Place cord over and under tabs on pointer (see detail), and place pointer on top of rail.
(13) Turn tuning shaft fully CCW. Slide pointer to (0) while holding tuning shaft fully CCW. Cement pointer to cord to prevent slippage. Allow cement to thoroughly dry.
(14) Check dial calibration. Refer to FM/AM ALIGNMENT.

HARMONIC DISTORTION TEST

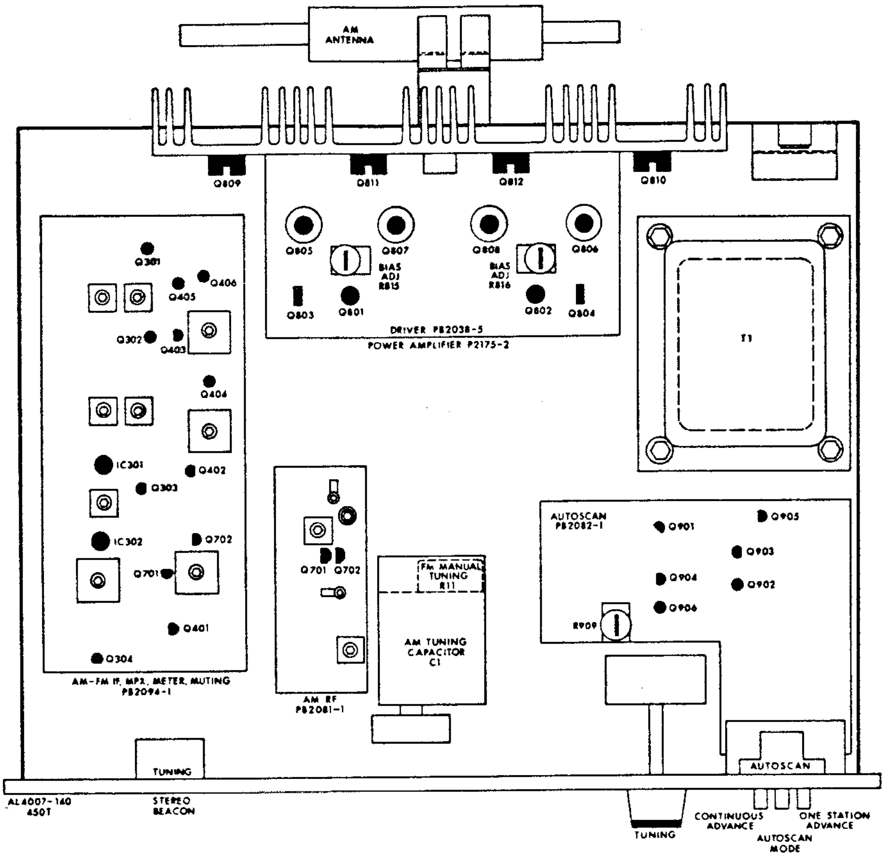
CAUTION:
(A) Measure the power of one channel at a time.
(B) Limit measurements to 10 minutes.
(C) Use a load with a minimum power rating of 100 watts.

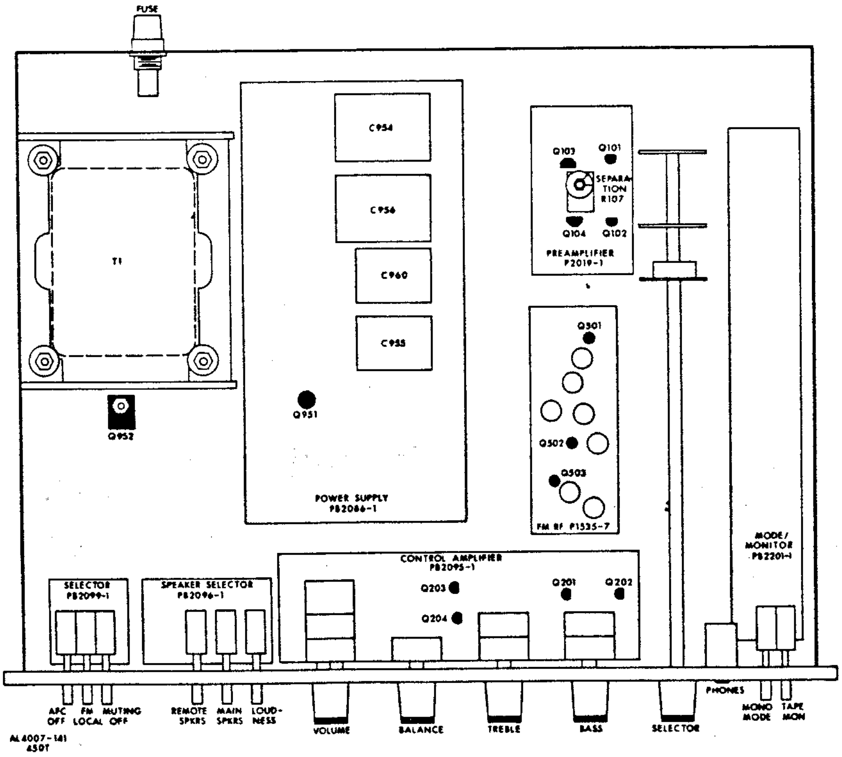
Set BASS, TREBLE, and BALANCE to their center positions. Set SELECTOR to AUX 1. Depress MAIN SPKRS switch. Unplug AC power cord.
(1) Connect a low-distortion sine-wave generator to the LEFT AUX 1 IN jack. Set generator frequency to 1,000 Hz, and output level to minimum.
(2) Connect an 8-ohm load resistor between the LEFT SPEAKERS MAIN and COMmon terminals. In parallel with the load resistor, connect the input leads of an HD analyzer and the input leads of an accurately calibrated AC VTVM.
(3) Connect AC power cord and rotate VOLUME to maximum.
(4) Increase generator level for 55 watts output (21.0 V RMS across 8-ohm load). HD meter should read 0.5% or less.
(5) Repeat preceding steps for right channel.


DIAL POINTER DETAIL
PULLEY Ⓑ
PULLEY Ⓒ
MACHINE SCREW
BACK
BEVELED WASHER
FROM PULLEY Ⓒ
TO GROOVE 5
4 3 2 1
GROOVE 5
FINISH
DRUM FULLY CLOCKWISE
DETAIL
START
DRUM FULLY COUNTERCLOCKWISE
SPRING
DRIVE DRUM EAR
FROM GROOVE 3
TO TUNING SHAFT
BACK
5 4 3 2 1
GROOVE 3
PULLEY Ⓐ
TUNING SHAFT
INS 470
P1677
P4007

CHASSIS LAYOUT

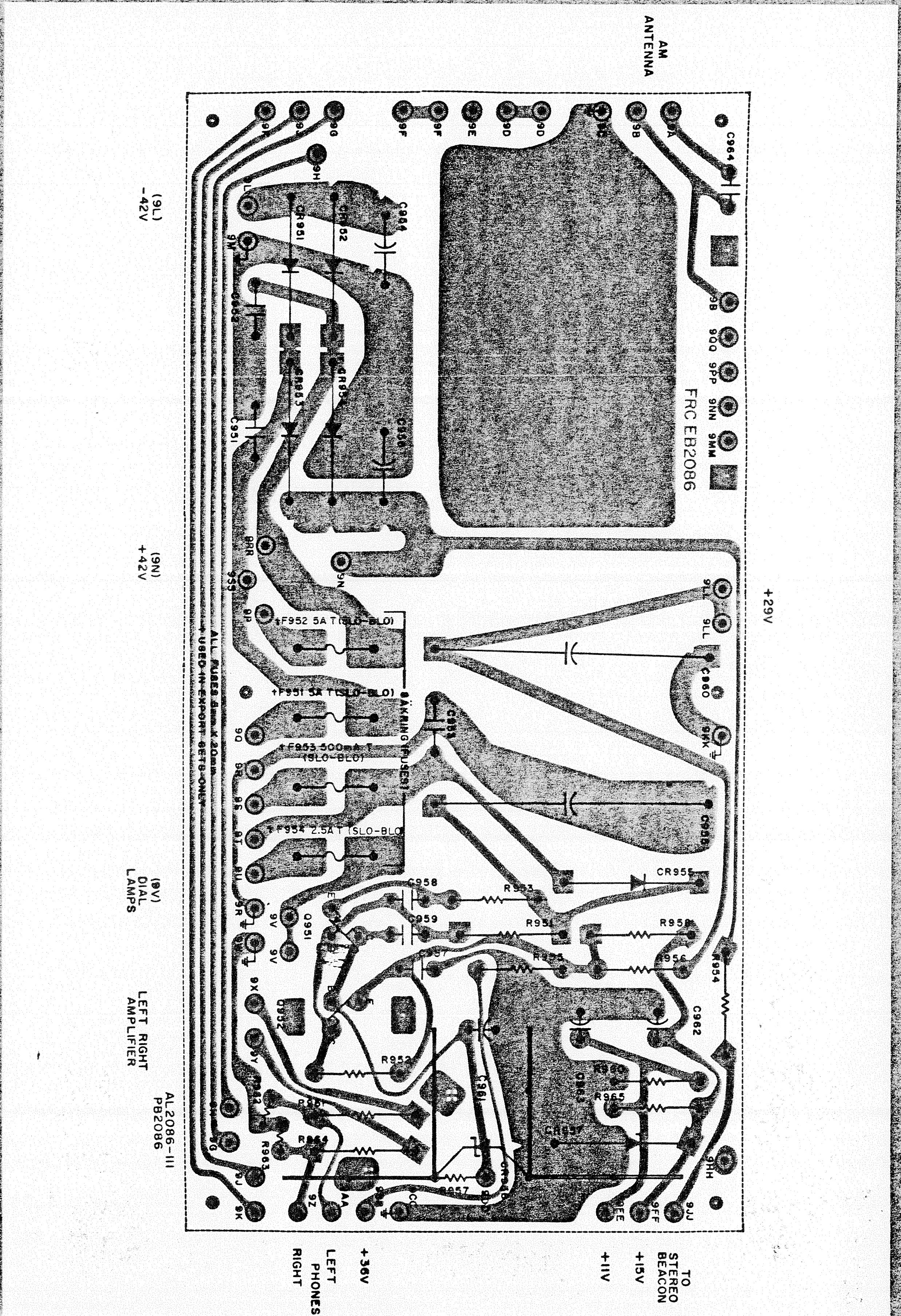
TOP VIEW


AM ANTENNA
Q809
Q811
Q812
Q810
Q805
Q807
Q808
Q806
BIAS ADJ R815
BIAS ADJ R816
Q803
Q801
Q802
Q804
DRIVER PB2038-5
POWER AMPLIFIER P2175-2
T1
Q301
Q406
Q405
Q302
Q403
Q404
IC301
Q402
Q303
IC302
Q702
Q701
Q401
Q304
AM-FM IF, MPX, METER, MUTING
PB2094-1
Q701 Q702
AM RF
PB2081-1
FM MANUAL TUNING R11
AM TUNING CAPACITOR C1
AUTOSCAN
PB2082-1
Q901
Q905
Q903
Q904
Q902
Q906
R909
TUNING
AUTOSCAN
AL4007-140
450T
STEREO BEACON
TUNING
CONTINUOUS ADVANCE
ONE STATION ADVANCE
AUTOSCAN MODE


FUSE
C954
C956
C960
C955
T1
Q952
Q951
POWER SUPPLY
PB2086-1
Q103
Q101
SEPARATION R107
Q104
Q102
PREAMPLIFIER
P2019-1
Q501
Q502
Q503
FM RF P1535-7
MODE/MONITOR
PB2201-1
CONTROL AMPLIFIER
PB2095-1
Q203
Q204
Q201
Q202
SELECTOR
PB2099-1
SPEAKER SELECTOR
PB2096-1
AFC OFF
FM LOCAL
MUTING OFF
REMOTE SPKRS
MAIN SPKRS
LOUDNESS
VOLUME
BALANCE
TREBLE
BASS
SELECTOR
PHONES
MONO MODE
TAPE MON
AL4007-141
450T

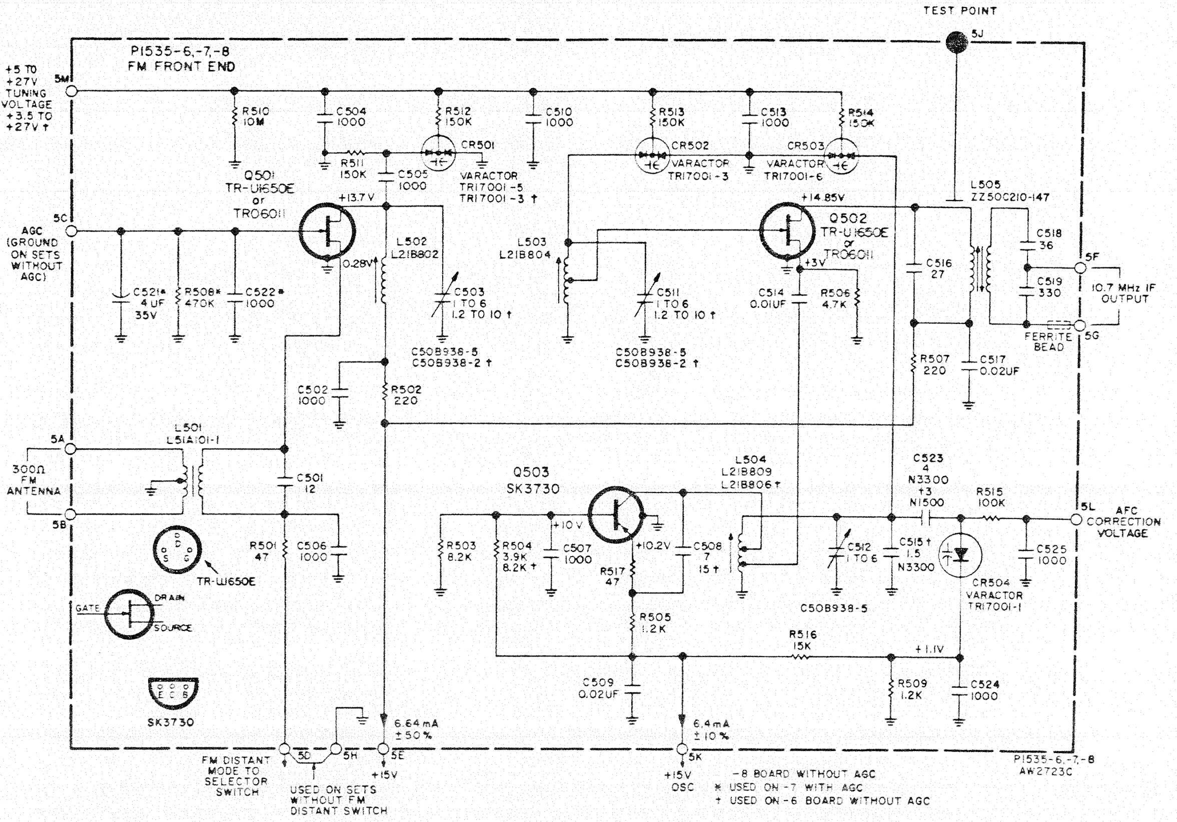
BOTTOM VIEW

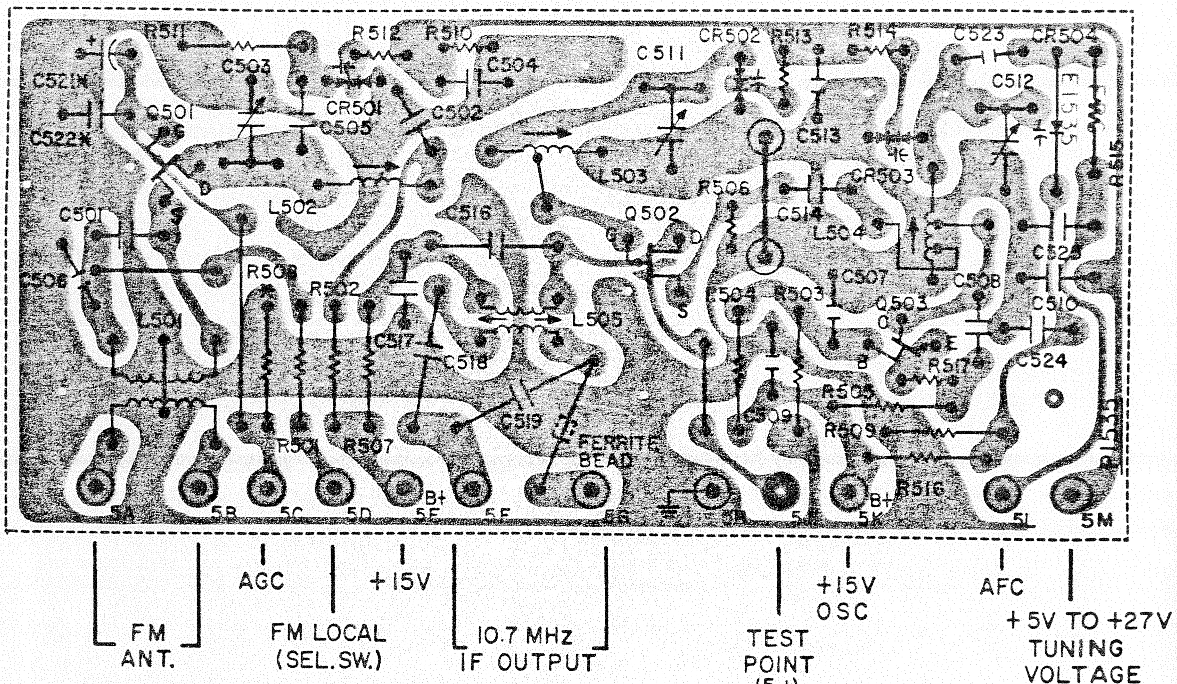
POWER SUPPLY 2086-1


AM ANTENNA
+29V
TO STEREO BEACON
+15V
+11V
+36V
LEFT PHONES RIGHT
AL2086-III
PB2086
LEFT RIGHT AMPLIFIER
(9V) DIAL LAMPS
(9N) +42V
(9L) -42V
FRC EB2086
ALL FUSES 5mm X 20mm
+ USED IN EXPORT SETS ONLY
SÄKRING (FUSES)
†F952 5A T (SLO-BLO)
†F951 5A T (SLO-BLO)
†F953 500mA T (SLO-BLO)
†F954 2.5A T (SLO-BLO)
C964
C954
C953
C951
C956
C960
C961
C955
C958
C959
C957
C962
CR951
CR952
CR953
CR954
CR955
CR956
CR957
CR958
Q951
Q952
Q953
R951
R952
R953
R954
R955
R956
R957
R958
R960
R961
R962
R963
R964
R965
9A
9B
9C
9D
9E
9F
9G
9H
9J
9K
9L
9M
9N
9P
9Q
9R
9S
9T
9U
9V
9X
9Y
9Z
9AA
9BB
9CC
9EE
9FF
9HH
9JJ
9KK
9LL
9MM
9NN
9PP
9QQ
9RR
9SS

SCHEMATIC SHOWN ON MAIN CHASSIS DIAGRAM

FM RF 1535-7


TEST POINT
5J
P1535-6,-7,-8
FM FRONT END
+5 TO +27V TUNING VOLTAGE +3.5 TO +27V †
5M
R510 10M
C504 1000
R512 150K
C510 1000
R513 150K
C513 1000
R514 150K
CR501
R511 150K
C505 1000
VARACTOR TR17001-5 TR17001-3 †
CR502 VARACTOR TR17001-3
CR503 VARACTOR TR17001-6
L505 ZZ50C210-147
Q501 TR-U1650E or TR06011
+13.7V
+14.85V
Q502 TR-U1650E or TR06011
5C
AGC (GROUND ON SETS WITHOUT AGC)
L502 L21B802
L503 L21B804
0.28V
+3V
C516 27
C518 36
5F
C519 330
10.7 MHz IF OUTPUT
C521* 4 UF 35V
R508* 470K
C522* 1000
C503 1 TO 6 1.2 TO 10 †
C511 1 TO 6 1.2 TO 10 †
C514 0.01UF
R506 4.7K
FERRITE BEAD
5G
C508938-5 C508938-2 †
C508938-5 C508938-2 †
R507 220
C517 0.02UF
C502 1000
R502 220
5A
L501 L51A101-1
300Ω FM ANTENNA
5B
C501 12
Q503 SK3730
L504 L21B809 L21B806 †
C523 4 N3300 +3 N1500
R515 100K
5L
AFC CORRECTION VOLTAGE
+10V
+10.2V
R501 47
C506 1000
R503 8.2K
R504 3.9K 8.2K †
C507 1000
R517 47
C508 7 15 †
C512 1 TO 6
C515 † 1.5 N3300
C525 1000
CR504 VARACTOR TR17001-1
D S G
TR-U1650E
GATE DRAIN SOURCE
C508938-5
R505 1.2K
R516 15K
+1.1V
C509 0.02UF
R509 1.2K
C524 1000
E C B
SK3730
6.64 mA ±50%
6.4 mA ±10%
5D 5H 5E
5K
FM DISTANT MODE TO SELECTOR SWITCH
USED ON SETS WITHOUT FM DISTANT SWITCH
+15V
+15V OSC
-8 BOARD WITHOUT AGC
* USED ON -7 WITH AGC
† USED ON -6 BOARD WITHOUT AGC
P1535-6,-7,-8
AW2723C


R511
R512
R510
C521X
C503
C504
C511
CR502
R513
R514
C523
CR504
C512
Q501
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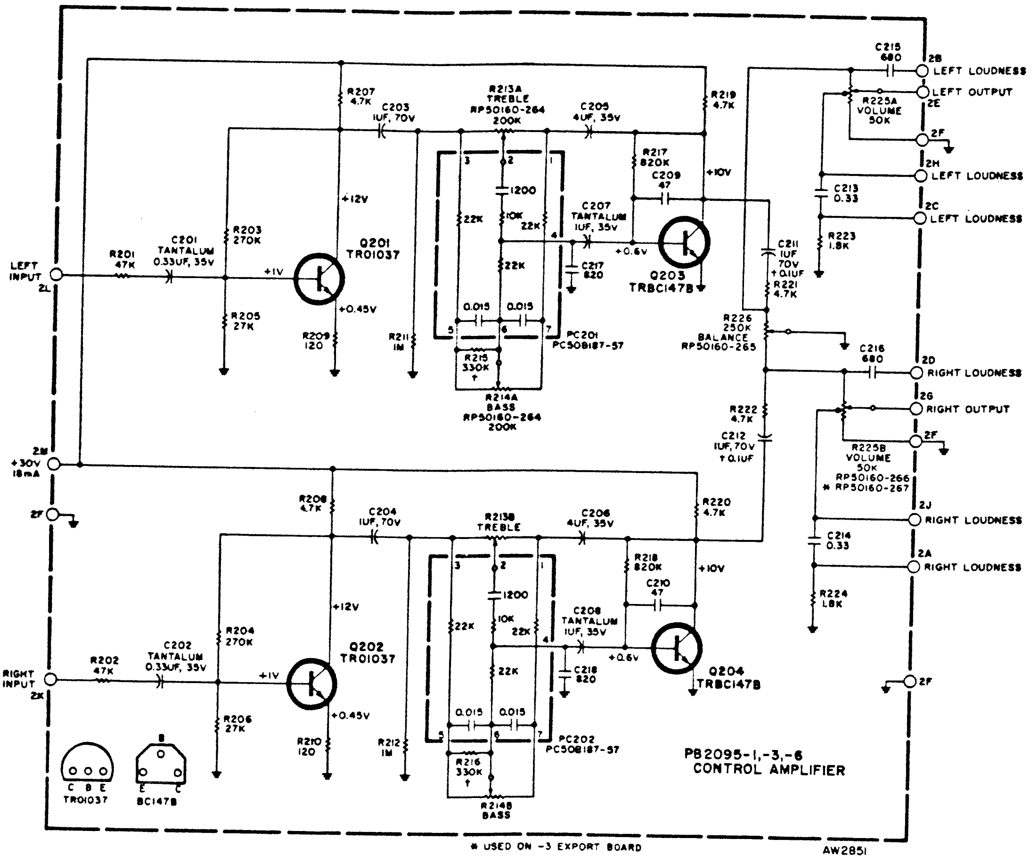
C502
C522X
C505
C513
E1535
R515
L503
CR503
G
D
S
L502
R506
C501
C516
Q502
C514
L504
R508
D
C525
C506
R502
C507
C508
L501
L505
S
R504
R503
Q503
C510
C517
C518
R517
C524
C509
R505
C519
FERRITE BEAD
R509
R501
R507
P1535
B+
B+
R516
5A
5B
5C
5D
5E
5F
5G
5H
5J
5K
5L
5M
FM ANT.
AGC
FM LOCAL (SEL.SW.)
+15V
10.7 MHz IF OUTPUT
TEST POINT (5J)
+15V OSC
AFC
+ 5V TO +27V TUNING VOLTAGE

* SEE SCHEMATIC

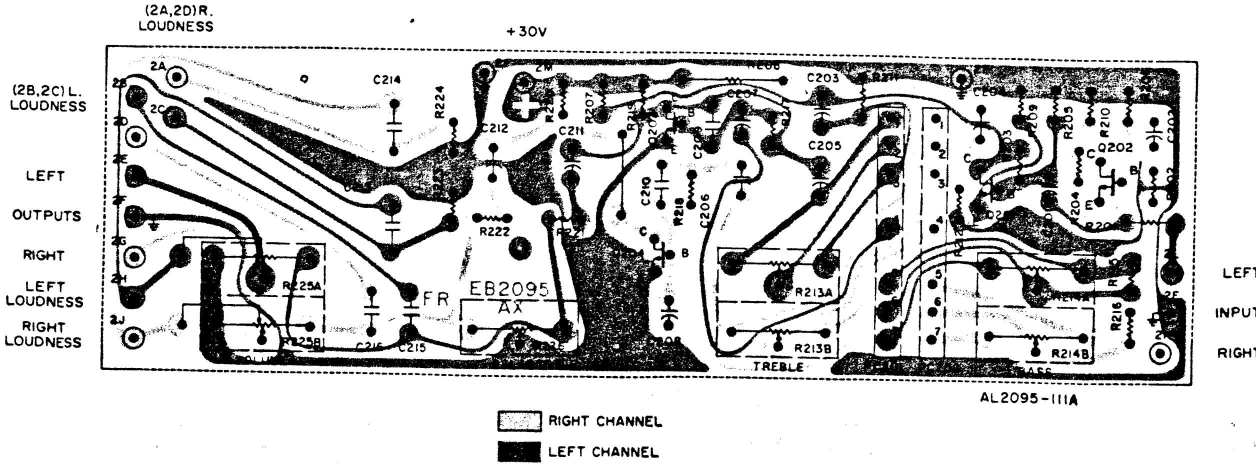
P1535
1L1535B113D

CONTROL AMPLIFIER 2095 - 1

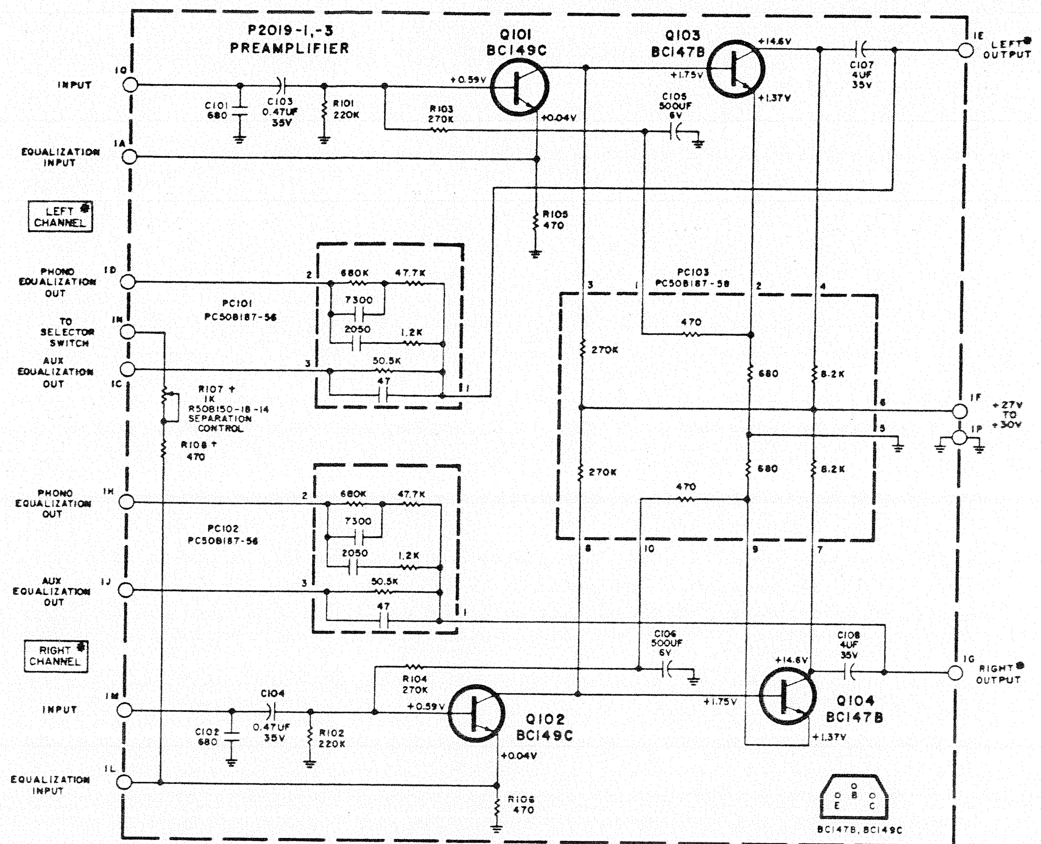

LEFT INPUT
2L
R201
47K
C201
TANTALUM
0.33UF, 35V
R203
270K
R205
27K
+1V
Q201
TR01037
+12V
+0.45V
R207
4.7K
R209
120
C203
1UF, 70V
R211
1M
R213A
TREBLE
RP50160-264
200K
1200
22K
10K
22K
22K
0.015
0.015
R215
330K
†
R214A
BASS
RP50160-264
200K
PC201
PC508187-57
C205
4UF, 35V
R217
820K
C209
47
C207
TANTALUM
1UF, 35V
+0.6V
C217
820
Q203
TRBC147B
R219
4.7K
+10V
C211
1UF
70V
† 0.1UF
R221
4.7K
R226
250K
BALANCE
RP50160-265
C215
680
2B
LEFT LOUDNESS
LEFT OUTPUT
2E
R225A
VOLUME
50K
2F
2H
LEFT LOUDNESS
C213
0.33
2C
LEFT LOUDNESS
R223
1.8K
C216
680
2D
RIGHT LOUDNESS
2G
RIGHT OUTPUT
R222
4.7K
C212
1UF, 70V
† 0.1UF
2F
R225B
VOLUME
50K
RP50160-266
* RP50160-267
2J
RIGHT LOUDNESS
C214
0.33
2A
RIGHT LOUDNESS
R224
1.8K
2M
+30V
18mA
2F
R208
4.7K
C204
1UF, 70V
R213B
TREBLE
C206
4UF, 35V
R220
4.7K
R218
820K
+10V
C210
47
1200
10K
22K
22K
22K
C208
TANTALUM
1UF, 35V
+0.6V
C218
820
Q204
TRBC147B
2F
RIGHT INPUT
2K
R202
47K
C202
TANTALUM
0.33UF, 35V
R204
270K
R206
27K
+1V
Q202
TR01037
+12V
+0.45V
R210
120
R212
1M
0.015
0.015
PC202
PC508187-57
R216
330K
†
R214B
BASS
C B E
TR01037
B
E C
BC147B
PB2095-1,-3,-6
CONTROL AMPLIFIER
AW2851

* USED ON -3 EXPORT BOARD

† R215 AND R216 OMITTED, C211 AND C212 0.1UF ON -6 CONSOLE BOARD

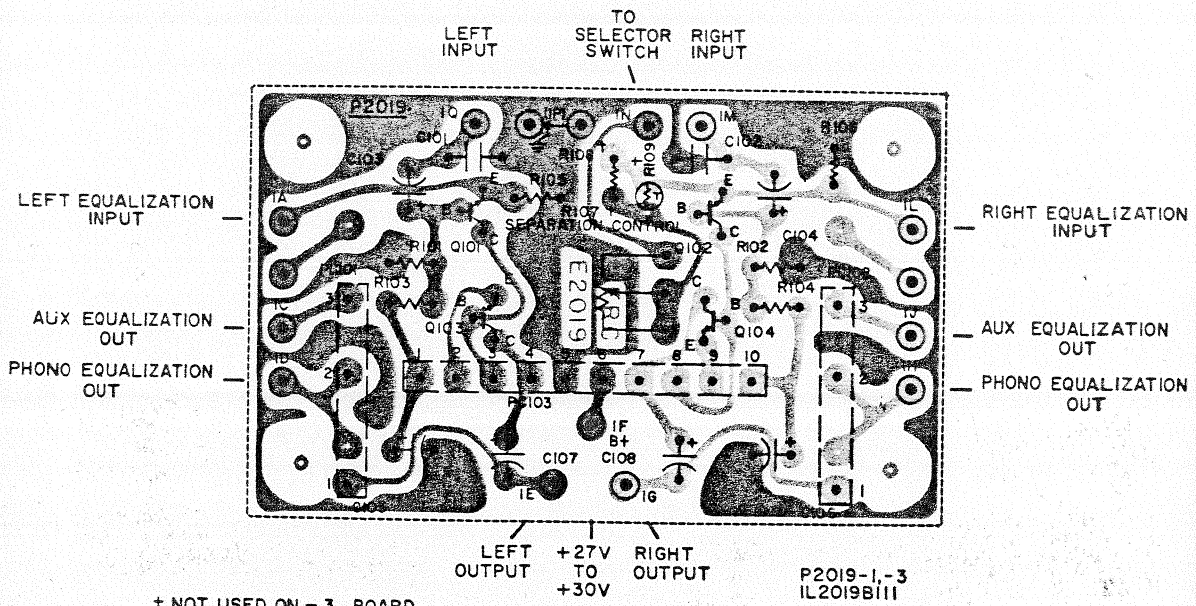

(2A,2D)R.
LOUDNESS
+30V
(2B,2C)L.
LOUDNESS
LEFT
OUTPUTS
RIGHT
LEFT
LOUDNESS
RIGHT
LOUDNESS
2A
2B
2C
2D
2E
2F
2G
2H
2J
2M
C214
R224
C212
C211
R222
R225A
R225B
C216
C215
FR
EB2095
AX
R226
C210
R218
C206
C203
C205
R213A
R213B
TREBLE
R214B
BASS
R207
R209
R205
R210
Q202
R204
R216
2K
2L
2F
LEFT
INPUTS
RIGHT
AL2095-111A
RIGHT CHANNEL
LEFT CHANNEL

PREAMPLIFIER 2019 - 1


P2019-1,-3
PREAMPLIFIER
INPUT
EQUALIZATION INPUT
LEFT * CHANNEL
PHONO EQUALIZATION OUT
TO SELECTOR SWITCH
AUX EQUALIZATION OUT
RIGHT * CHANNEL
LEFT * OUTPUT
RIGHT * OUTPUT
+27V TO +30V
Q101 BC149C
Q103 BC147B
Q102 BC149C
Q104 BC147B
C101 680
C103 0.47UF 35V
R101 220K
R103 270K
R105 470
C105 500UF 6V
C107 4UF 35V
C102 680
C104 0.47UF 35V
R102 220K
R104 270K
R106 470
C106 500UF 6V
C108 4UF 35V
PC101 PC508187-56
PC102 PC508187-56
PC103 PC508187-58
680K
47.7K
7300
2050
1.2K
50.5K
47
270K
470
680
8.2K
R107 † 1K R508150-18-14 SEPARATION CONTROL
R108 † 470
+0.59V
+0.04V
+1.75V
+14.6V
+1.37V
BC147B, BC149C
E B C
P2019
AW27808

† NOT USED ON - 3 BOARD.

* NOTE: RIGHT AND LEFT CHANNEL DESIGNATIONS MAY BE INTERCHANGED ON SOME MODELS. REFER TO MAIN CHASSIS SCHEMATIC FOR LEFT AND RIGHT CHANNEL IDENTIFICATION.


LEFT INPUT
TO SELECTOR SWITCH
RIGHT INPUT
LEFT EQUALIZATION INPUT
AUX EQUALIZATION OUT
PHONO EQUALIZATION OUT
RIGHT EQUALIZATION INPUT
AUX EQUALIZATION OUT
PHONO EQUALIZATION OUT
LEFT OUTPUT
+27V TO +30V
RIGHT OUTPUT
P2019
E2019
SEPARATION CONTROL
Q101
Q102
Q103
Q104
PC103
C107
C108
B+
P2019-1,-3
IL2019B111

† NOT USED ON – 3 BOARD

▨ LEFT CHANNEL

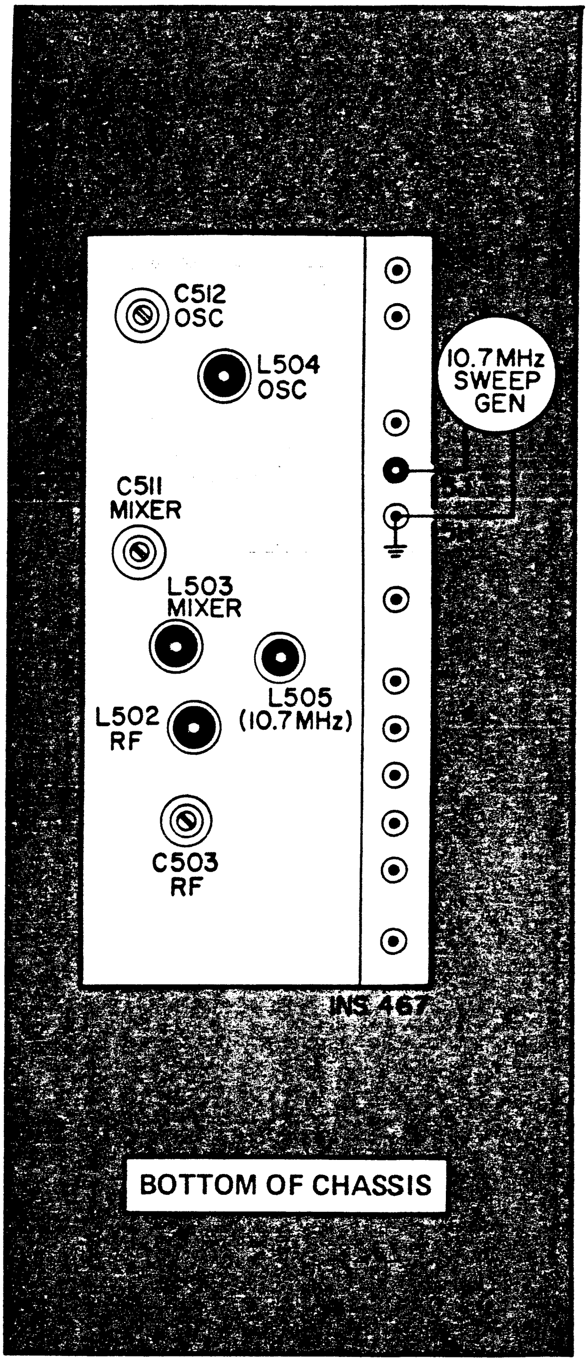
☐ RIGHT CHANNEL

TUNER ALIGNMENT

Turn TUNING knob fully CCW. If pointer is not centered on (0), reposition and cement pointer. Except as noted, maintain generator level as low as possible during alignment.

FM ALIGNMENT

(1) Set SELECTOR to FM. Turn VOLUME to minimum. Depress MUTING OFF and AFC OFF switches. Release AUTOSCAN MODE switch (manual tuning operation).
(2) Disconnect jumper from pin 3N. Connect AC input of scope to pin 3N, scope ground to pin 3G.
(3) Connect 10.7MHz sweep generator to pin 5J, generator ground to pin 5H.
(4) Adjust top and bottom cores of Z305, Z304, Z302, and L505 for maximum gain and symmetry. See FM IF illustration.
(5) Increase generator level to full output (approximately 100mV). If necessary, slightly readjust top core of Z305 to center 10.7MHz marker (see FM-IF LIMITED illustration).
(6) Reconnect jumper to pin 3N. Connect a 100k resistor in series with AC input of scope and connect to pin 3M, scope ground to pin 3L.
(7) Adjust bottom and top cores of Z306. See FM DETECTOR illustration.
(8) Connect DC VTVM to pin 3M. Use lowest (most sensitive) range. Readjust top core of Z306 for 0 VDC. Disconnect test equipment.
(9) Connect an accurately calibrated DC VTVM to pin A9 (on AUTOSCAN board.)
(10) Center dial pointer on 88MHz fiducial mark (1.1 on logging scale). Using a small screwdriver, adjust R11A (on back of AM tuning capacitor) for exactly 4.3 VDC. Disconnect DC VTVM.
(11) Connect an FM signal generator to FM ANTenna terminals through 120-ohm composition resistors, one in series with each lead from the generator. Connect a scope and an AC VTVM to the LEFT RCDR 1 OUT jack.
(12) Set generator frequency and dial pointer accurately to 90MHz (1.87 on logging scale). Modulate generator with 400Hz, ±75kHz deviation. Adjust top and bottom core of L504, and top core of L503, and L502 for maximum AC, and maximum on front panel tuning meter. Maintain generator level for front panel tuning meter reading between 2 and 3.
(13) Set generator frequency and dial pointer accurately to 104MHz (7.53 on logging scale). Adjust C512, C511, and C503 for maximum AC and maximum on front panel tuning meter.
(14) Repeat steps (12) and (13) for accurate dial calibration and maximum audio.
(15) Modulate generator with 400Hz, ±25kHz deviation.
(16) Reduce generator output until noise interference is visible on sine wave. Adjust generator frequency to center noise interference on positive and negative half-cycles. See SYMMETRICAL TUNING illustration.
(17) Turn-on muting circuit by releasing MUTING OFF switch. Scope trace should disappear. Slowly increase generator output until trace reappears. Generator output should be between 20uV and 50uV (10uV to 25uV at antenna terminals through 120-ohm resistors).
(18) Increase generator output to 1mV. Adjust R328 FM METER ADJ. for front panel tuning meter reading of 4.5.
(19) Increase generator level to 10mV. Connect MPX generator composite output to FM signal generator EXTERNAL MODULATION input. Modulate generator signal with 19kHz, ±7.5kHz deviation (10% pilot, no audio).
(20) Connect DC VTVM to pin 4G. Tune receiver accurately to generator frequency. Adjust Z401, and Z402 for maximum DC (2.5 to 4 VDC).
(21) Modulate generator with MPX composite signal, ±75kHz deviation (90% 1kHz audio, 10% 19kHz pilot). Modulate right channel only.
(22) Connect an AC VTVM to LEFT RCDR 1 OUT jack. Connect another AC VTVM to RIGHT RCDR 1 OUT jack. Connect scope input to pin 4K.
(23) Using an ohmmeter, temporarily set R107 SEPARATION CONTROL (on preamplifier board) to maximum resistance. Adjust Z403 for maximum scope amplitude and as straight a base-line as possible (see MPX illustration). Left channel AC should be minimum.

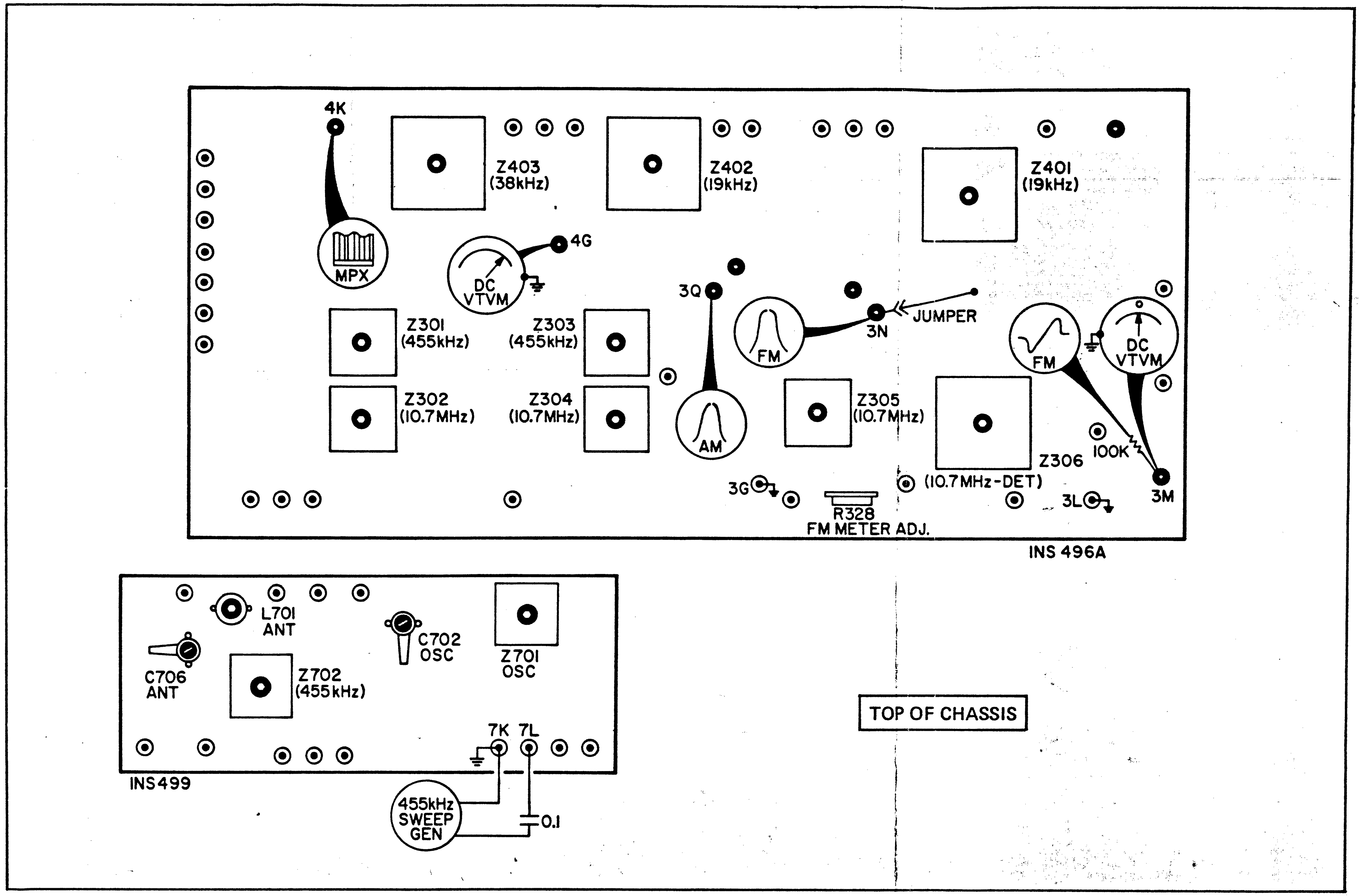


BOTTOM OF CHASSIS

(24) Modulate left channel only. Adjust R107 SEPARATION CONTROL for minimum AC on right channel (at least 30dB below left channel).
(25) Modulate right channel only. Left channel should be at least 30dB below right channel.
NOTE: If separation measurements are not within 3dB of each other, readjust Z402 slightly, and repeat (23) through (25).

AM ALIGNMENT

(1) Set SELECTOR to AM, VOLUME to minimum.
(2) Connect 455kHz sweep generator to pin 7L, generator ground to pin 7K. Use a 0.1uF capacitor in series with generator lead.
(3) Connect scope input to pin 3Q, scope ground to pin 3G.


4K
Z403
(38kHz)
Z402
(19kHz)
Z401
(19kHz)
MPX
DC
VTVM
4G
3Q
FM
3N
JUMPER
FM
DC
VTVM
Z301
(455kHz)
Z303
(455kHz)
Z302
(10.7MHz)
Z304
(10.7MHz)
AM
Z305
(10.7MHz)
Z306
(10.7MHz-DET)
100K
3G
R328
FM METER ADJ.
3L
3M
INS 496A
L701
ANT
C702
OSC
Z701
OSC
C706
ANT
Z702
(455kHz)
7K
7L
455kHz
SWEEP
GEN
0.1
INS499
TOP OF CHASSIS

(4) Adjust top and bottom cores of Z303, Z301, and Z702 for maximum gain and symmetry. See AM IF illustration. Disconnect test equipment.

(5) Open AM ANTenna GND link. Connect an AM signal generator to the AM ANT and GND terminals. Use a 220pF capacitor in series with generator lead. Connect a scope and an AC VTVM to LEFT RCDR 1 OUT jack.

(6) Set generator frequency and dial pointer to 600kHz (2.1 on logging scale). Modulate generator with 400Hz, 30% modulation. Adjust Z701 for maximum audio.

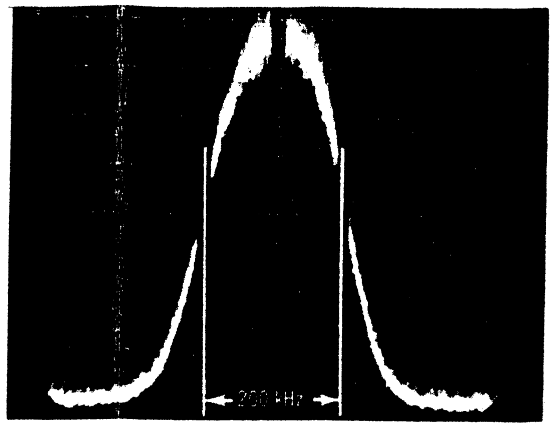
(7) Set generator frequency and dial pointer to 1400kHz (8.47 on logging scale). Adjust C702 for maximum audio.

(8) Repeat steps (6) and (7) for accurate dial calibration and maximum gain.

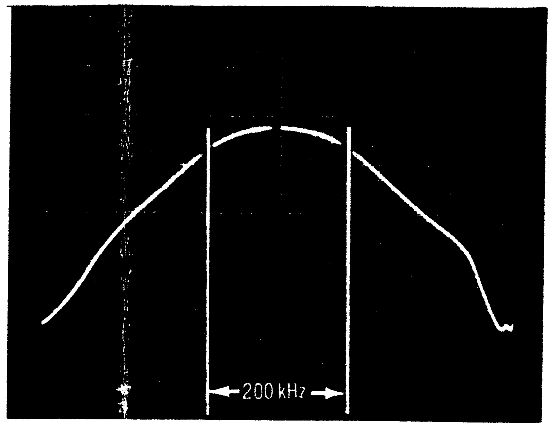
(9) Reset generator and pointer to 600kHz. Adjust L701 for maximum audio.

(10) Reset generator and pointer to 1400kHz. Adjust C706 for maximum audio.

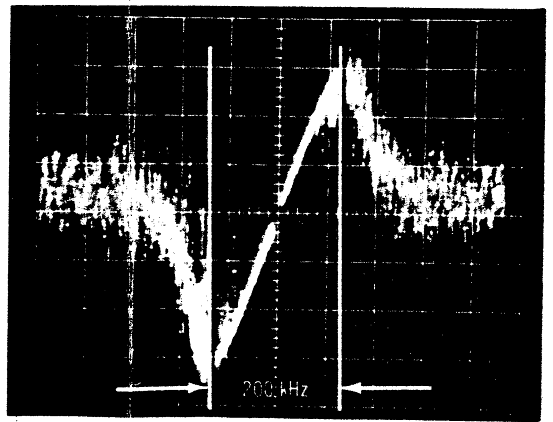
(11) Repeat steps (9) and (10) for maximum gain.



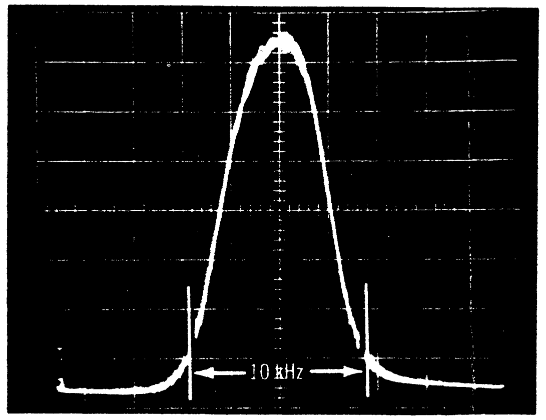
FM IF



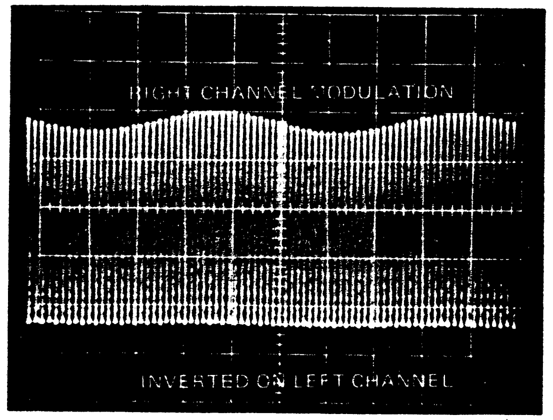
FM IF-LIMITED



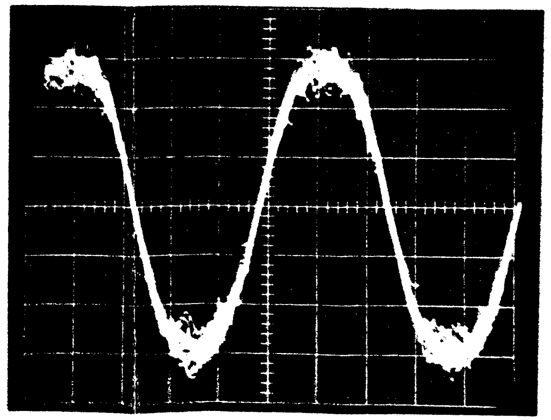
FM DETECTOR



AM IF

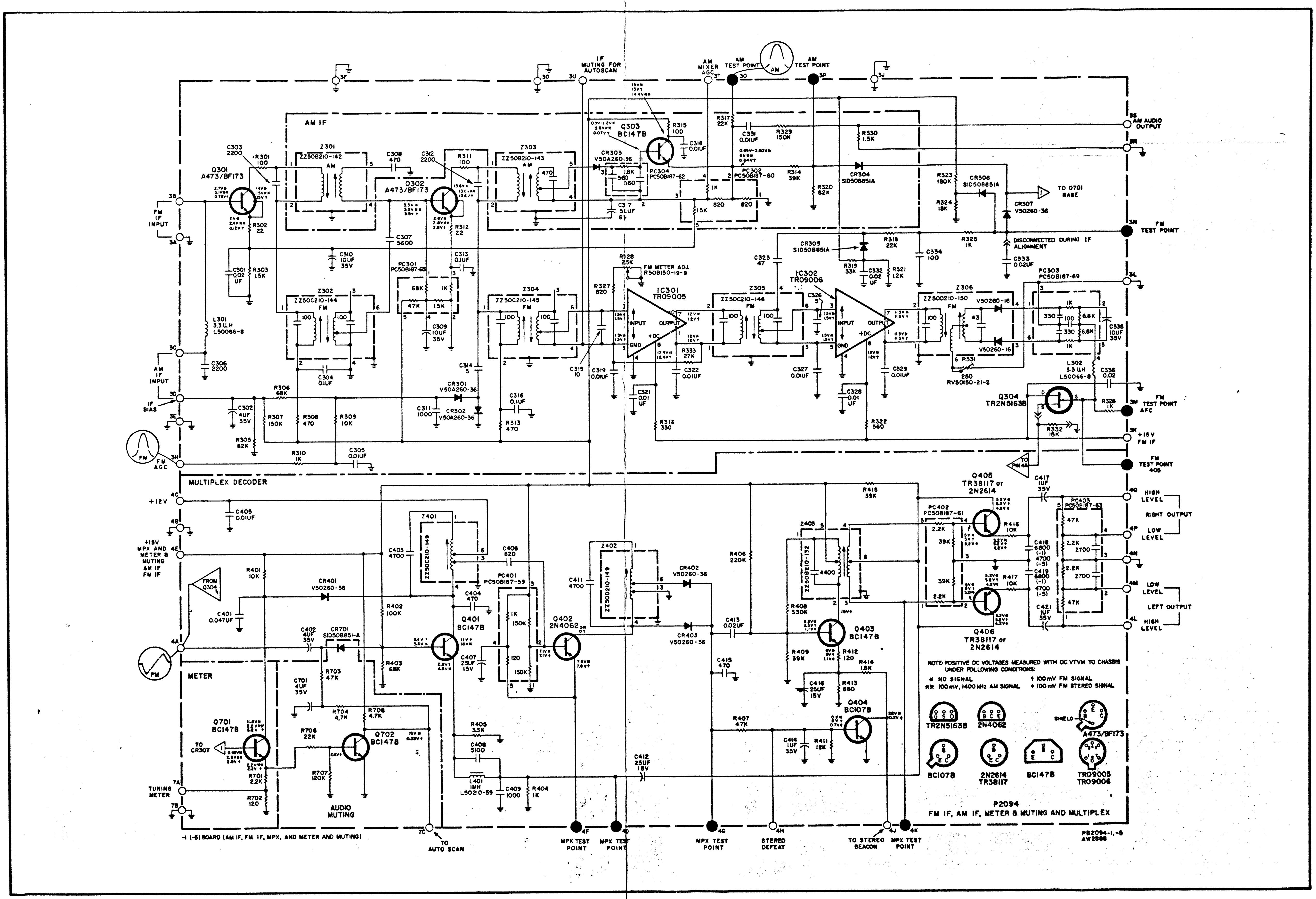


MPX



SYMMETRICAL TUNING

AM-FM IF, MPX, METER, MUTING 2094-1


AM IF
FM IF INPUT
AM IF INPUT
IF BIAS
FM AGC
IF MUTING FOR AUTOSCAN
AM MIXER AGC
AM TEST POINT
AM TEST POINT
AM AUDIO OUTPUT
TO Q701 BASE
DISCONNECTED DURING IF ALIGNMENT
FM TEST POINT
FM TEST POINT AFC
+15V FM IF
FM TEST POINT 405
TO PIN 4A
FM METER ADJ. R50B150-19-9
Q301 A473/BF173
Q302 A473/BF173
Q303 BC147B
Q304 TR2N5163B
IC301 TR09005
IC302 TR09006
Z301 ZZ508210-142
Z302 ZZ50C210-144
Z303 ZZ508210-143
Z304 ZZ50C210-145
Z305 ZZ50C210-146
Z306 ZZ50D210-150
PC301 PC50B187-65
PC302 PC50B187-60
PC303 PC50B187-69
PC304 PC50B187-62
L301 3.3UH L50066-8
L302 3.3UH L50066-8
MULTIPLEX DECODER
+12V
+15V MPX AND METER & MUTING AM IF FM IF
FROM Q304
METER
TUNING METER
TO CR307
AUDIO MUTING
Q401 BC147B
Q402 2N4062
Q403 BC147B
Q404 BC107B
Q405 TR38117 or 2N2614
Q406 TR38117 or 2N2614
Q701 BC147B
Q702 BC147B
Z401 ZZ50C210-149
Z402 ZZ50D210-149
Z403 ZZ50B210-152
PC401 PC50B187-59
PC402 PC50B187-61
PC403 PC50B187-63
L401 1MH L50210-59
HIGH LEVEL
RIGHT OUTPUT
LOW LEVEL
LOW LEVEL
LEFT OUTPUT
HIGH LEVEL
MPX TEST POINT
MPX TEST POINT
MPX TEST POINT
STEREO DEFEAT
TO STEREO BEACON
MPX TEST POINT
TO AUTO SCAN
-1 (-5) BOARD (AM IF, FM IF, MPX, AND METER AND MUTING)
TR2N5163B
2N4062
A473/BF173
SHIELD
BC107B
2N2614 TR38117
BC147B
TR09005 TR09006
P2094
FM IF, AM IF, METER & MUTING AND MULTIPLEX
PB2094-1,-5
AW2888

NOTE: POSITIVE DC VOLTAGES MEASURED WITH DC VTVM TO CHASSIS UNDER FOLLOWING CONDITIONS:

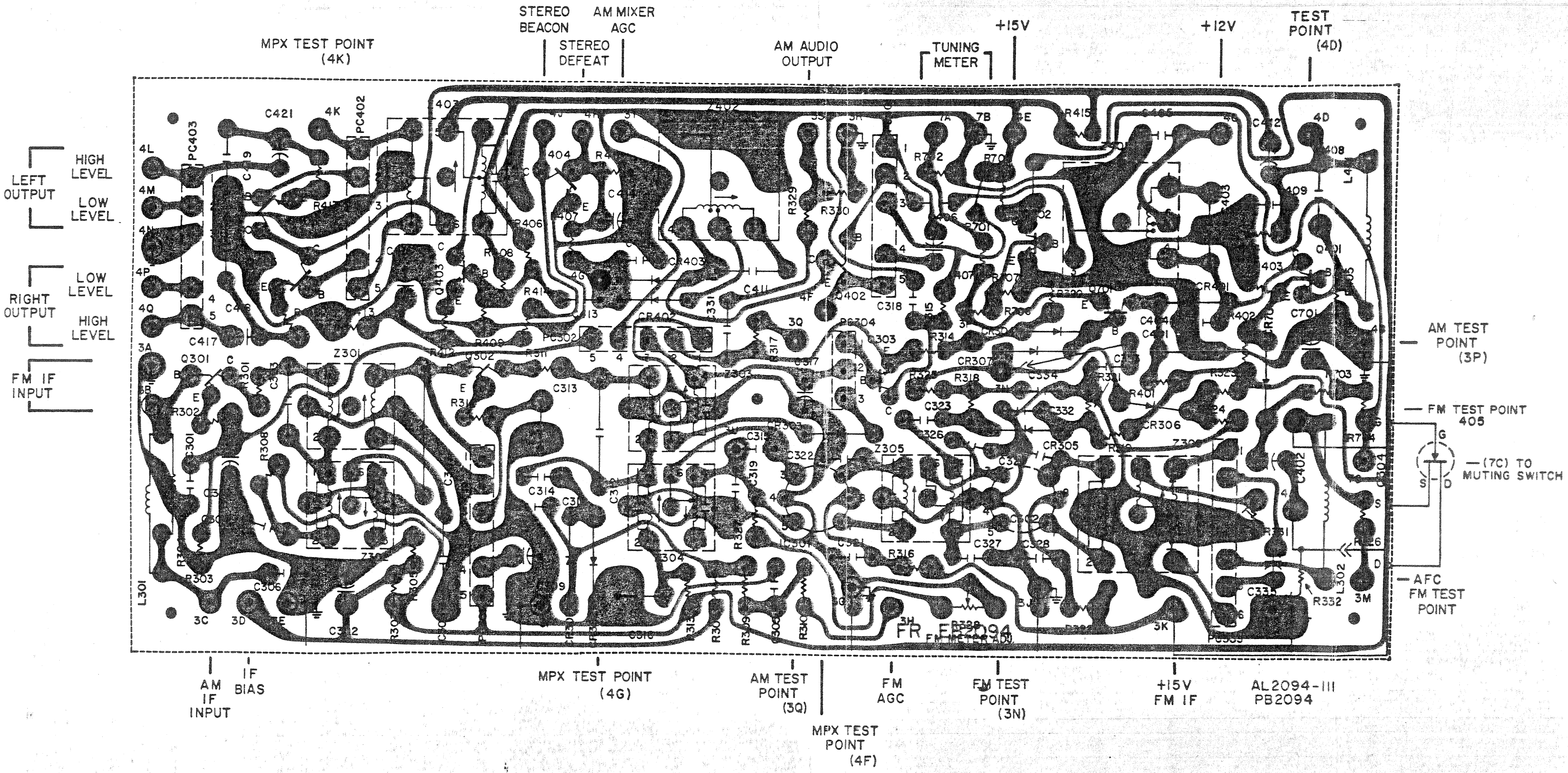
* NO SIGNAL

** 100mV, 1400kHz AM SIGNAL

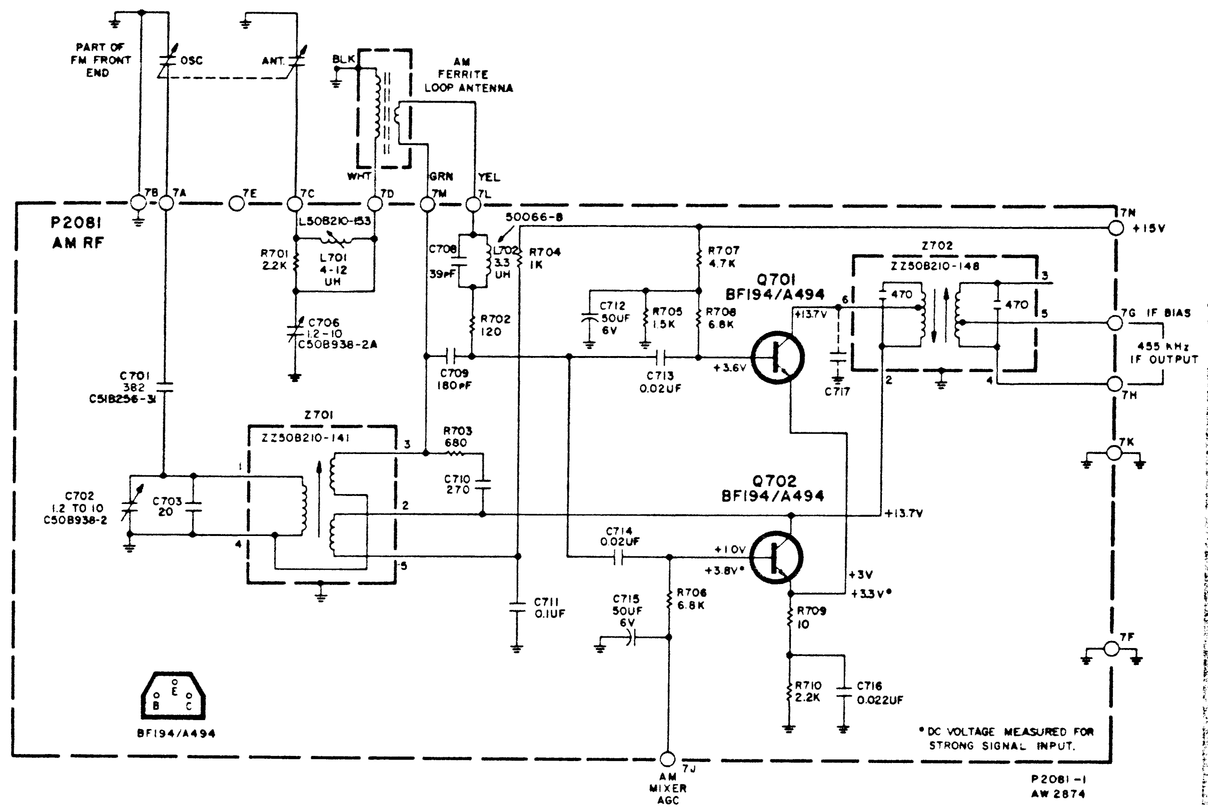
† 100mV FM SIGNAL

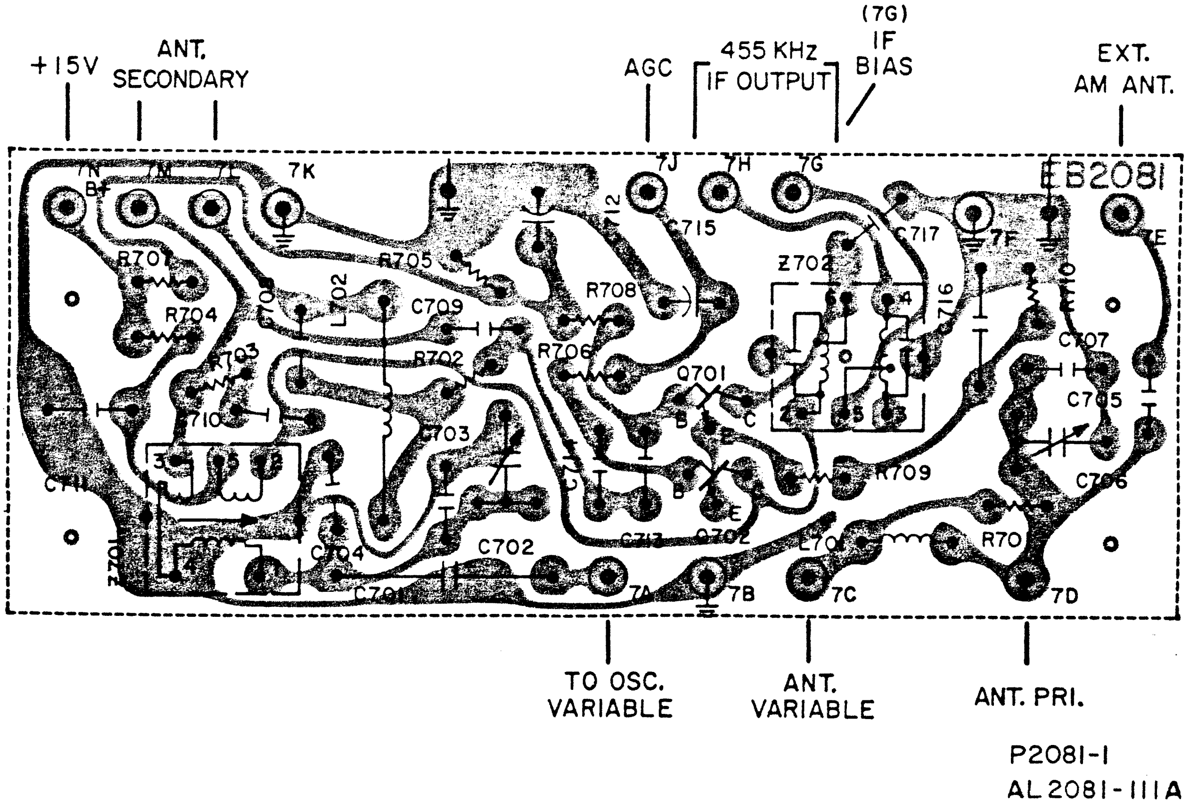
♦ 100mV FM STEREO SIGNAL

AM-FM IF, MPX, METER, MUTING 2094 - 1

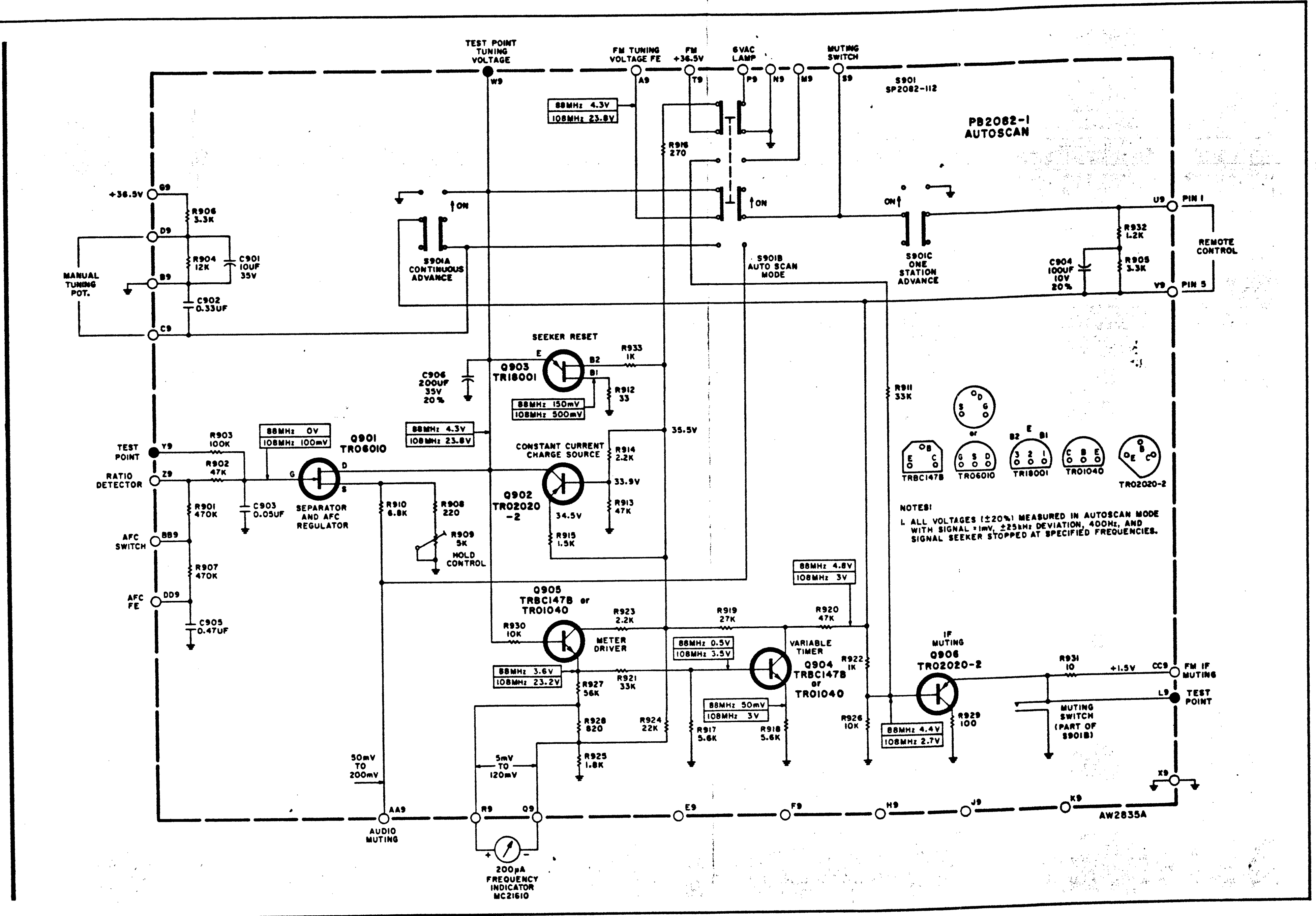

STEREO BEACON
AM MIXER AGC
STEREO DEFEAT
MPX TEST POINT (4K)
AM AUDIO OUTPUT
TUNING METER
+15V
+12V
TEST POINT (4D)
LEFT OUTPUT
HIGH LEVEL
LOW LEVEL
RIGHT OUTPUT
LOW LEVEL
HIGH LEVEL
FM IF INPUT
AM TEST POINT (3P)
FM TEST POINT 405
(7C) TO MUTING SWITCH
G
S
D
AFC FM TEST POINT
AM IF INPUT
IF BIAS
MPX TEST POINT (4G)
AM TEST POINT (3Q)
MPX TEST POINT (4F)
FM AGC
FM TEST POINT (3N)
+15V FM IF
AL2094-III
PB2094

AM RF 2081-1


PART OF
FM FRONT
END
OSC
ANT.
BLK
AM
FERRITE
LOOP ANTENNA
WHT
GRN
YEL
7B
7A
7E
7C
7D
7M
7L
7N
+15V
P2081
AM RF
L50B210-153
R701
2.2K
L701
4-12
UH
C706
1.2-10
C50B938-2A
C701
382
C51B256-31
50066-8
C708
39pF
L702
3.3
UH
R704
1K
R702
120
C709
180pF
R707
4.7K
R708
6.8K
C712
50UF
6V
R705
1.5K
C713
0.02UF
Q701
BF194/A494
+3.6V
+13.7V
Z702
ZZ50B210-148
470
470
6
3
5
2
4
C717
7G IF BIAS
455 kHz
IF OUTPUT
7H
7K
Z701
ZZ50B210-141
1
3
2
4
5
R703
680
C710
270
C702
1.2 TO 10
C50B938-2
C703
20
Q702
BF194/A494
+13.7V
C714
0.02UF
+10V
+3.8V*
+3V
+3.3V*
C711
0.1UF
C715
50UF
6V
R706
6.8K
R709
10
R710
2.2K
C716
0.022UF
7F
B E C
BF194/A494
* DC VOLTAGE MEASURED FOR
STRONG SIGNAL INPUT.
7J
AM
MIXER
AGC
P2081-1
AW 2874


(7G)
IF
BIAS
+15V
ANT.
SECONDARY
AGC
455 KHz
IF OUTPUT
EXT.
AM ANT.
7N
B+
7M
7L
7K
7J
7H
7G
EB2081
7F
7E
R707
R704
R703
R710
C710
L702
C709
R705
R702
R706
R708
C712
C715
C717
Z702
C716
R710
C707
C705
C706
Q701
B
E
C
B
E
Q702
R709
C703
C702
C704
C701
C711
Z701
C713
L701
R701
7A
7B
7C
7D
TO OSC.
VARIABLE
ANT.
VARIABLE
ANT. PRI.
P2081-1
AL2081-111A

AUTOSCAN 2082 - 1


TEST POINT TUNING VOLTAGE
W9
FM TUNING VOLTAGE FE
A9
FM +36.5V
T9
6VAC LAMP
P9
N9
M9
MUTING SWITCH
S9
S901 SP2082-112
PB2082-1 AUTOSCAN
88MHz 4.3V
108MHz 23.8V
R916 270
ON
ON
S901A CONTINUOUS ADVANCE
S901B AUTO SCAN MODE
S901C ONE STATION ADVANCE
+36.5V
G9
R906 3.3K
D9
R904 12K
C901 10UF 35V
MANUAL TUNING POT.
B9
C902 0.33UF
C9
U9
PIN 1
R932 1.2K
REMOTE CONTROL
C904 100UF 10V 20%
R905 3.3K
V9
PIN 5
SEEKER RESET
E
B2
B1
Q903 TR18001
R933 1K
R912 33
C906 200UF 35V 20%
88MHz 150mV
108MHz 500mV
35.5V
R911 33K
TEST POINT
Y9
R903 100K
88MHz 0V
108MHz 100mV
Q901 TR06010
88MHz 4.3V
108MHz 23.8V
CONSTANT CURRENT CHARGE SOURCE
R914 2.2K
RATIO DETECTOR
Z9
R902 47K
G
D
S
33.9V
R901 470K
C903 0.05UF
SEPARATOR AND AFC REGULATOR
R910 6.8K
R908 220
Q902 TR02020 -2
34.5V
R913 47K
R915 1.5K
R909 5K
HOLD CONTROL
AFC SWITCH
BB9
R907 470K
AFC FE
DD9
C905 0.47UF
TRBC147B
TR06010
TR18001
TR01040
TR02020-2
88MHz 4.8V
108MHz 3V
Q905 TRBC147B or TR01040
R923 2.2K
R919 27K
R920 47K
R930 10K
METER DRIVER
88MHz 0.5V
108MHz 3.5V
VARIABLE TIMER
Q904 TRBC147B or TR01040
R922 1K
IF MUTING
Q906 TR02020-2
R931 10
+1.5V
CC9
FM IF MUTING
L9
TEST POINT
88MHz 3.6V
108MHz 23.2V
R921 33K
R927 56K
88MHz 50mV
108MHz 3V
R928 820
R924 22K
R917 5.6K
R918 5.6K
R926 10K
88MHz 4.4V
108MHz 2.7V
R929 100
MUTING SWITCH (PART OF S901B)
R925 1.8K
50mV TO 200mV
5mV TO 120mV
X9
AA9
AUDIO MUTING
R9
Q9
E9
F9
H9
J9
K9
AW2835A
200μA FREQUENCY INDICATOR MC21610

NOTES:

1. ALL VOLTAGES (±20%) MEASURED IN AUTOSCAN MODE WITH SIGNAL = 1mV, ±25kHz DEVIATION, 400Hz, AND SIGNAL SEEKER STOPPED AT SPECIFIED FREQUENCIES.

The emitter of IF muting transistor Q906 is DC-coupled to the IF amplifier. When the receiver is tuned on-station, Q906 is reverse-biased, and operation of the IF amplifier is unaffected. When either ADVANCE button is pressed, the grounding of C904 momentarily drops the base voltage and forward-biases Q906, shorting the IF amplifier. The drop in IF signal level releases the hold on the tuning voltage across C906 and the receiver begins to scan. As the voltage on C904 rises, Q906 resumes reverse-bias operation and the IF amplifier becomes operative. The release time (the time during which the IF is muted by Q906) must be sufficiently long to allow the receiver to tune off-station, but short enough to prevent station skipping.

To sweep the receiver 1MHz requires a change in tuning voltage of approximately ½ volt at 88MHz, and approximately 1½ volts at 108MHz. Therefore, tuning time varies about 1:3 between 88MHz and 108MHz. The corresponding release time at 108MHz must be three times longer than at 88MHz. Variable timer transistor Q904 progressively loads the base of Q906 to lower the voltage applied to C904, and lengthen the release time at 108MHz.

To eliminate switch noise, the IF is momentarily shorted by the muting switch whenever the AUTOSCAN MODE switch is actuated.

ADJUSTMENT AND TEST

Alignment of FM IF and RF, MPX, and detector should be checked before attempting an AUTOSCAN test or adjustment.

(1) Connect an FM signal generator to FM ANTenna terminals through 120-ohm composition resistors, one in a series with each lead from the generator. Connect a DC VTVM to pin 9Y, and a scope to LEFT RCDR 1 OUT jack.

(2) Set SELECTOR to FM. Turn VOLUME to minimum. Depress AFC OFF switch. Depress AUTOSCAN MODE switch (electronic tuning).

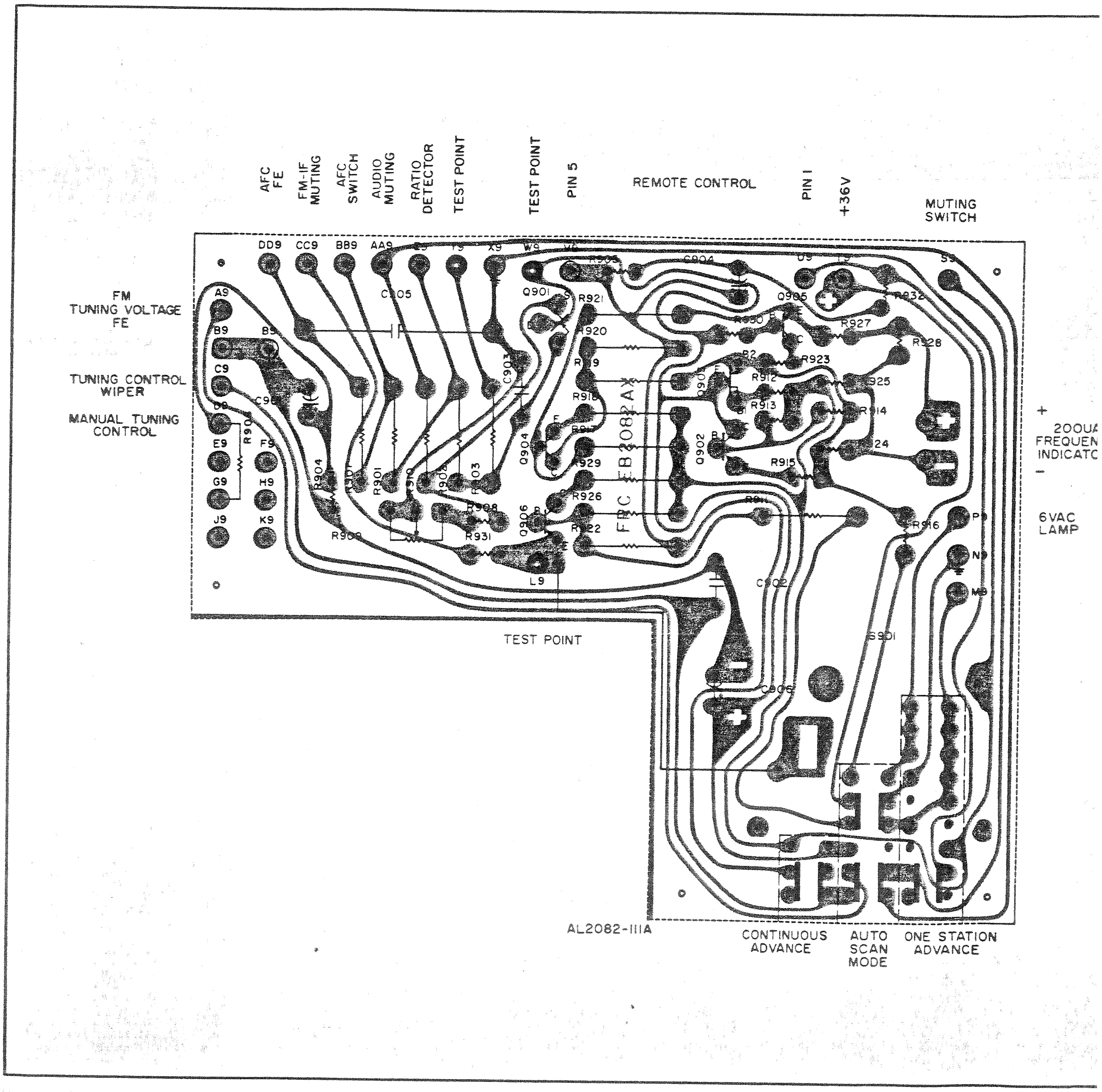
(3) Set generator frequency to 88MHz. Modulate generator with 400Hz, ±25kHz deviation. Set generator output to 10mV.

(4) Tune receiver to generator frequency (at 88MHz) by pressing either ADVANCE pushbutton.

(5) Carefully adjust HOLD CONTROL R909 for 0 VDC. Use lowest (most sensitive) meter scale.

(6) Reduce generator output to 100uV. Press and hold CONTINUOUS ADVANCE pushbutton until AUTOSCAN meter approaches top of scale. Receiver should automatically tune to generator frequency at 88MHz. After 5 seconds, DC VTVM should indicate 0 VDC.

(7) Set generator frequency to 108MHz. Tune receiver to generator frequency (at 108MHz) by pressing either ADVANCE pushbutton. After 5 seconds, meter should indicate less than 200mV.


AFC FE
FM-IF MUTING
AFC SWITCH
AUDIO MUTING
RATIO DETECTOR
TEST POINT
TEST POINT
PIN 5
REMOTE CONTROL
PIN 1
+36V
MUTING SWITCH
FM TUNING VOLTAGE FE
TUNING CONTROL WIPER
MANUAL TUNING CONTROL
+
200UA
FREQUEN
INDICATO
-
6VAC LAMP
DD9
CC9
BB9
AA9
X9
W9
A9
B9
C9
E9
F9
G9
H9
J9
K9
Q901
R921
R920
C905
C903
R919
R918
R917
Q904
R929
R926
Q906
R922
R931
R908
R909
R904
R901
R902
R903
C904
Q905
R930
R927
R928
R923
R912
R913
R925
R914
R924
Q902
R915
R911
R916
S9
U9
P9
N9
M9
C902
S901
C906
L9
FRC EB2082AX
TEST POINT
AL2082-111A
CONTINUOUS ADVANCE
AUTO SCAN MODE
ONE STATION ADVANCE

CIRCUIT DESCRIPTION

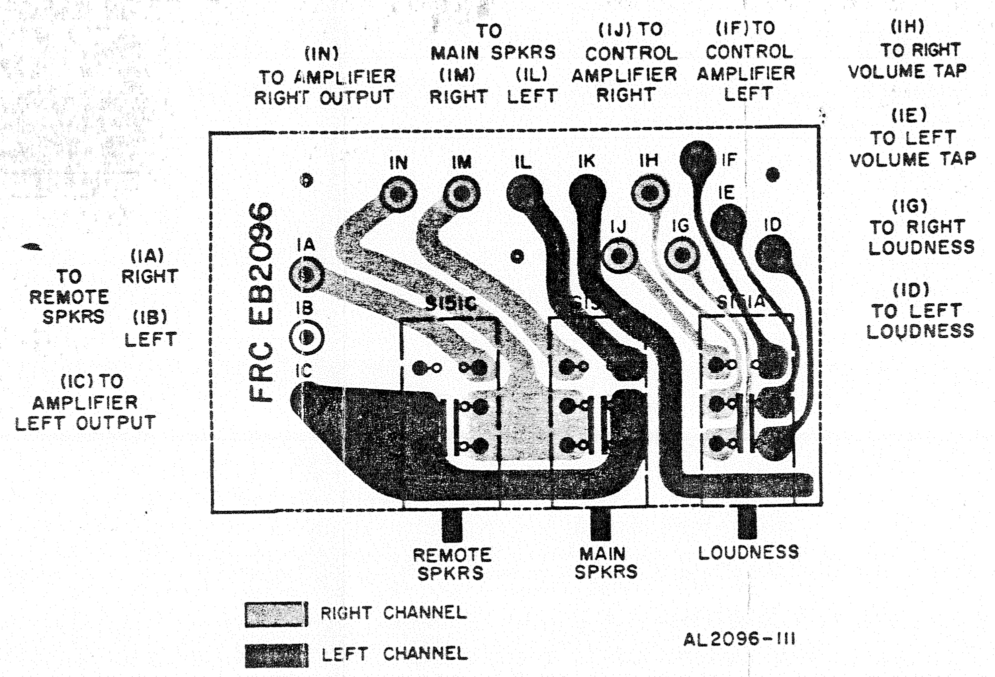
The FM RF circuitry utilizes variable capacitance diodes, called varactors. When reverse-biased, these diodes exhibit a change in capacity as the reverse-bias voltage is changed (i.e. increasing voltage decreases capacity). The front-end, therefore, is tuned by an applied DC 'tuning' voltage instead of a mechanical tuning gang. The AUTOSCAN circuit generates and controls this required tuning voltage.

Transistor Q902 provides a constant-current source to charge storage capacitor C906. As the tuning voltage on C906 rises, the front-end tunes upscale toward 108MHz. When the tuning voltage climbs to approximately +25V (108.5MHz), the emitter peak-point voltage of unijunction transistor Q903 is reached, and C906 is instantly discharged (through Q903) to approximately 3 volts. The moment C906 is discharged, Q903 resumes its normal operating state (essentially open-circuit), and the charging cycle repeats.

The separator and AFC regulator, field-effect transistor Q901, functions as a variable shunt across the constant current charge source. The gate is DC-coupled to the output of the ratio detector. When the output voltage of the detector sweeps to zero (exact center of station), Q901 loads the charging source to maintain a constant tuning voltage across C906. The hold control adjustment, R909, is used to set the load current equal to the charge current (constant tuning voltage) when the gate voltage is zero. The source of Q901 is DC-coupled to the audio muting circuit. When the receiver is tuned on-station, the muting output voltage is approximately zero. As the receiver tunes off-station, the muting voltage (applied to the source through R910) rises rapidly to +15V, allowing the tuning voltage to rise. When the receiver scans upscale to the next desired station, the muting and detector voltages swing to zero, and Q901 loads Q902 to establish and hold the correct tuning voltage.

PUSHBUTTON-SWITCH BOARDS

SPEAKER SELECTOR 2096 - 1

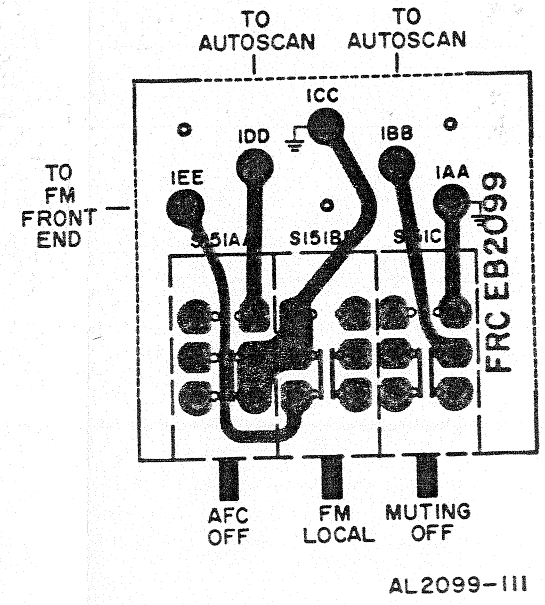

(IN)
TO AMPLIFIER
RIGHT OUTPUT
TO
MAIN SPKRS
(IM) RIGHT
(IL) LEFT
(IJ) TO
CONTROL
AMPLIFIER
RIGHT
(IF) TO
CONTROL
AMPLIFIER
LEFT
(IH)
TO RIGHT
VOLUME TAP
(IE)
TO LEFT
VOLUME TAP
(IG)
TO RIGHT
LOUDNESS
(ID)
TO LEFT
LOUDNESS
TO
REMOTE
SPKRS
(IA)
RIGHT
(IB)
LEFT
(IC) TO
AMPLIFIER
LEFT OUTPUT
FRC EB2096
IN
IM
IL
IK
IH
IF
IE
IJ
IG
ID
IA
IB
IC
S151C
S151B
S151A
REMOTE
SPKRS
MAIN
SPKRS
LOUDNESS

▨ RIGHT CHANNEL

■ LEFT CHANNEL

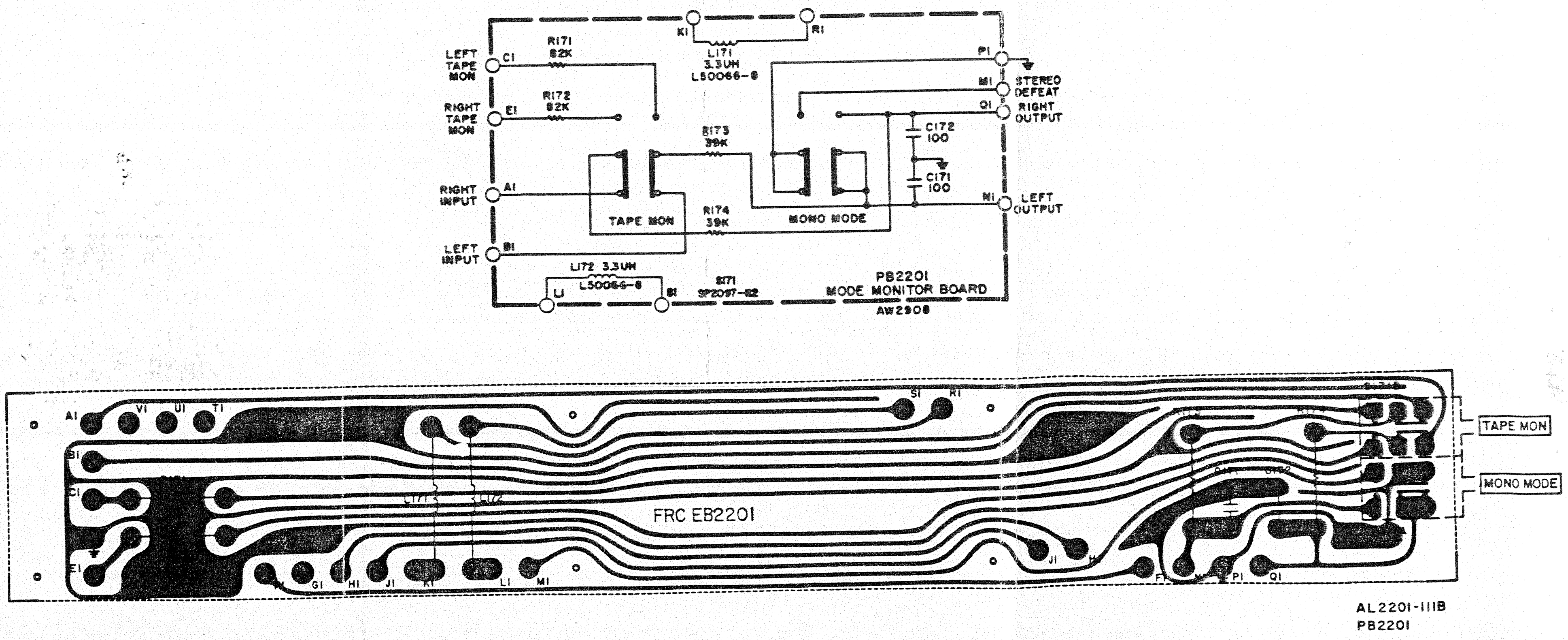
AL2096-III

SELECTOR 2099 - 1

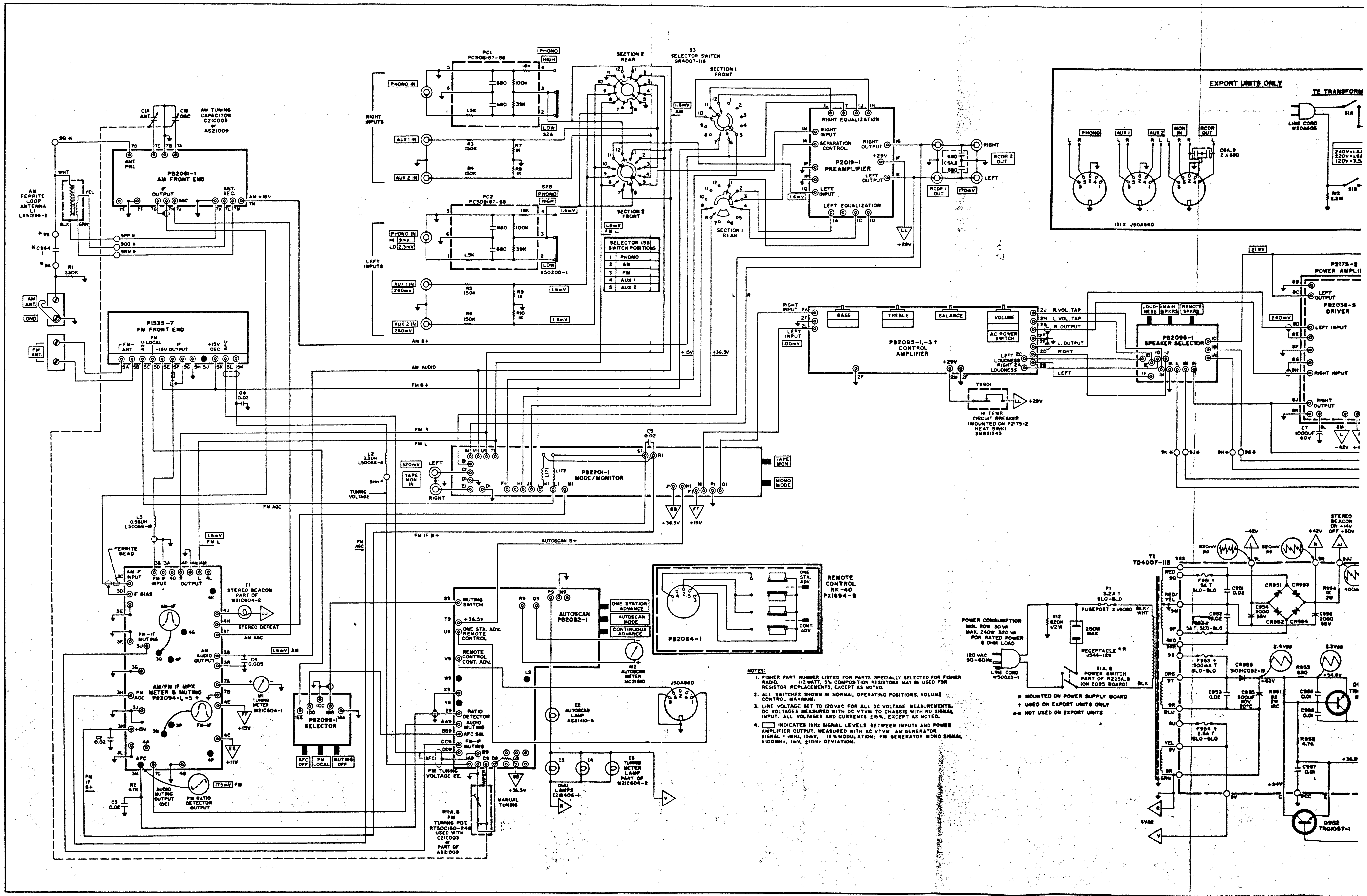

TO
AUTOSCAN
TO
AUTOSCAN
TO
FM
FRONT
END
ICC
IDD
IBB
IEE
IAA
S151AA
S151BB
S151CC
FRC EB2099
AFC
OFF
FM
LOCAL
MUTING
OFF

AL2099-III

MODE/MONITOR 2201 - 1


K1
R1
L171
3.3UH
L50066-8
R171
82K
R172
82K
LEFT
TAPE
MON
C1
RIGHT
TAPE
MON
E1
RIGHT
INPUT
A1
LEFT
INPUT
B1
R173
39K
R174
39K
TAPE MON
MONO MODE
P1
M1
STEREO
DEFEAT
Q1
RIGHT
OUTPUT
C172
100
C171
100
N1
LEFT
OUTPUT
L172 3.3UH
L50066-8
L1
S1
S171
SP2097-112
PB2201
MODE MONITOR BOARD
AW2908
A1
V1
U1
T1
B1
C1
E1
G1
H1
J1
K1
L1
M1
S1
R1
L171
L172
FRC EB2201
J1
F1
P1
Q1
TAPE MON
MONO MODE

AL2201-IIIB
PB2201


PC1 PC50B187-68
PHONO
HIGH
LOW
PHONO IN
RIGHT INPUTS
AUX 1 IN
AUX 2 IN
S2A
S2B
PC2 PC50B187-68
LEFT INPUTS
S50200-1
SECTION 2 REAR
S3 SELECTOR SWITCH SR4007-116
SECTION 1 FRONT
SECTION 2 FRONT
SECTION 1 REAR
SELECTOR (S3) SWITCH POSITIONS
1 PHONO
2 AM
3 FM
4 AUX 1
5 AUX 2
P2019-1 PREAMPLIFIER
RIGHT EQUALIZATION
LEFT EQUALIZATION
SEPARATION CONTROL
RCDR 2 OUT
RCDR 1 OUT
EXPORT UNITS ONLY
PHONO
AUX 1
AUX 2
MON IN
RCDR OUT
(3) X J50A860
LINE CORD W20A605
AM TUNING CAPACITOR C21C003 or AS21009
AM FERRITE LOOP ANTENNA L1 LA51296-2
PB2081-1 AM FRONT END
AM ANT.
GND
FM ANT.
P1535-7 FM FRONT END
PB2095-1,-3 † CONTROL AMPLIFIER
BASS
TREBLE
BALANCE
VOLUME
AC POWER SWITCH
PB2096-1 SPEAKER SELECTOR
LOUDNESS
MAIN SPKRS
REMOTE SPKRS
P2175-2 POWER AMPLI
PB2038-6 DRIVER
TS801 HI TEMP. CIRCUIT BREAKER (MOUNTED ON P2175-2 HEAT SINK) SM831245
PB2201-1 MODE/MONITOR
TAPE MON IN
TAPE MON
MONO MODE
L2 3.3UH L50066-8
L3 0.56UH L50066-19
FERRITE BEAD
AM/FM IF MPX METER & MUTING PB2094-1,-5 †
I1 STEREO BEACON PART OF M21C604-2
STEREO DEFEAT
M1 TUNING METER M21C604-1
PB2099-1 SELECTOR
AFC OFF
FM LOCAL
MUTING OFF
AUTOSCAN PB2082-1
ONE STATION ADVANCE
AUTOSCAN MODE
CONTINUOUS ADVANCE
M2 AUTOSCAN METER MC21610
I2 AUTOSCAN LAMP AS21410-4
DIAL LAMPS 1218406-1
I5 TUNING METER LAMP PART OF M21C604-2
R11A,B FM TUNING POT. RT50C160-248 USED WITH C21C003 or PART OF AS21009
MANUAL TUNING
PB2064-1
REMOTE CONTROL RK-40 PX1694-9
J50A860
T1 TD4007-115
F1 3.2A T SLO-BLO
FUSEPOST X59080
R12 820K 1/2W
250W MAX
RECEPTACLE ** J546-129
S1A,B POWER SWITCH PART OF R225A,B (ON 2095 BOARD)
120 VAC 50-60Hz
LINE CORD W50023-1
POWER CONSUMPTION MIN. 20W 30 VA MAX. 240W 320 VA FOR RATED POWER 8 OHM LOAD
CR951
CR952
CR953
CR954
Q962 TR21087-1
STEREO BEACON ON +14V OFF +30V

NOTES:

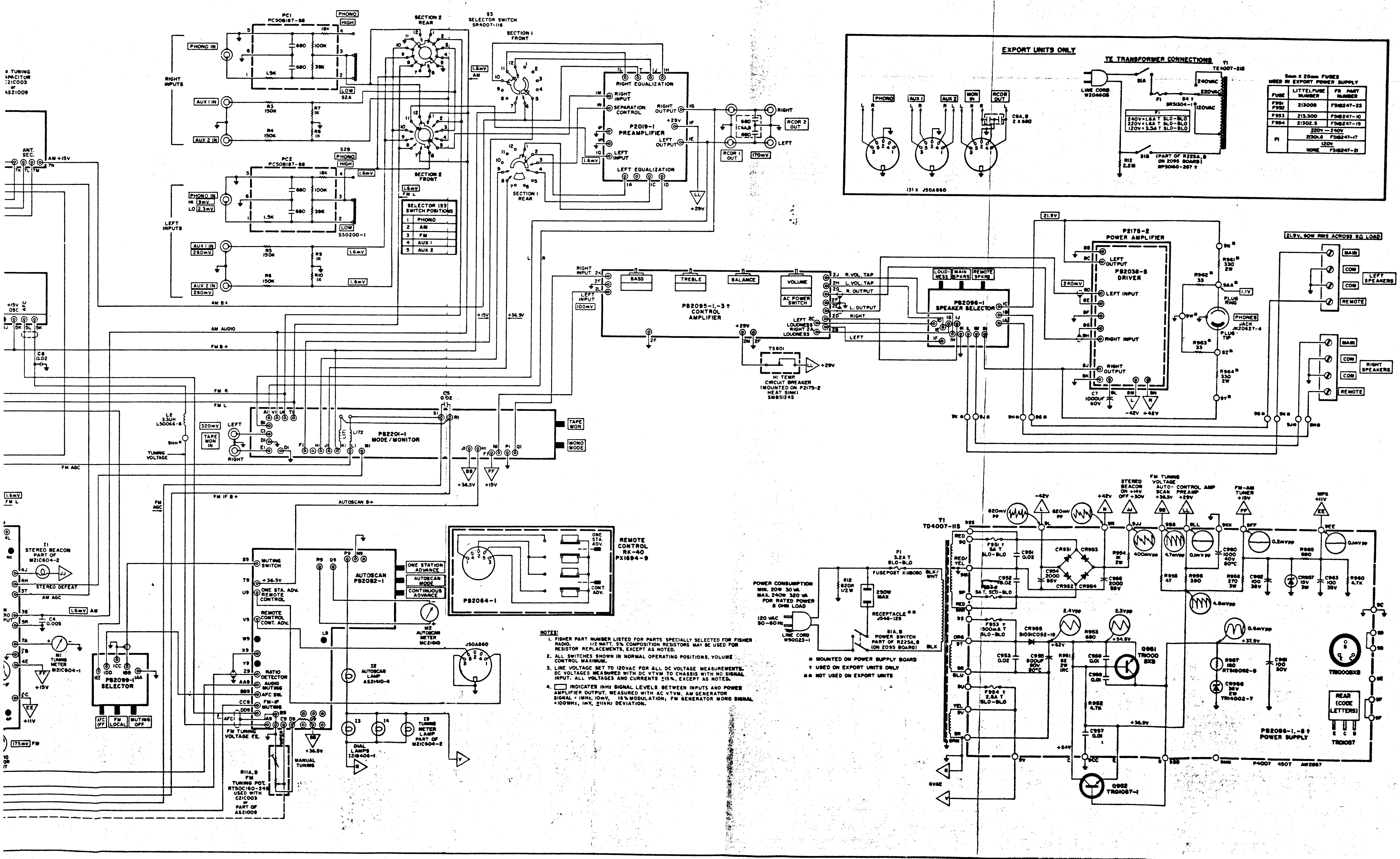
1. FISHER PART NUMBER LISTED FOR PARTS SPECIALLY SELECTED FOR FISHER RADIO. 1/2 WATT, 5% COMPOSITION RESISTORS MAY BE USED FOR RESISTOR REPLACEMENTS, EXCEPT AS NOTED.
2. ALL SWITCHES SHOWN IN NORMAL OPERATING POSITIONS, VOLUME CONTROL MAXIMUM.
3. LINE VOLTAGE SET TO 120VAC FOR ALL DC VOLTAGE MEASUREMENTS. DC VOLTAGES MEASURED WITH DC VTVM TO CHASSIS WITH NO SIGNAL INPUT. ALL VOLTAGES AND CURRENTS ±15%, EXCEPT AS NOTED.
4. ☐ INDICATES 1kHz SIGNAL LEVELS BETWEEN INPUTS AND POWER AMPLIFIER OUTPUT, MEASURED WITH AC VTVM, AM GENERATOR SIGNAL = 1MHz, 10mV, 16% MODULATION; FM GENERATOR MONO SIGNAL =100MHz, 1mV, ±11kHz DEVIATION.

* MOUNTED ON POWER SUPPLY BOARD

† USED ON EXPORT UNITS ONLY

** NOT USED ON EXPORT UNITS

MAIN CHASSIS


PHONO IN
RIGHT INPUTS
LEFT INPUTS
AUX 1 IN
AUX 2 IN
PC1 PC50B187-68
PC2 PC50B187-68
S3 SELECTOR SWITCH SR4007-116
SECTION 2 REAR
SECTION 1 FRONT
SECTION 2 FRONT
SECTION 1 REAR
P2019-1 PREAMPLIFIER
RIGHT EQUALIZATION
LEFT EQUALIZATION
RCDR 2 OUT
RCDR 1 OUT
EXPORT UNITS ONLY
TE TRANSFORMER CONNECTIONS
T1 TE4007-218
(3) X J50A860
P2175-2 POWER AMPLIFIER
PB2038-5 DRIVER
21.9V, 60W RMS ACROSS 8Ω LOAD
LEFT SPEAKERS
RIGHT SPEAKERS
PHONES JACK JK20627-4
PB2095-1,-3 † CONTROL AMPLIFIER
BASS
TREBLE
BALANCE
VOLUME
AC POWER SWITCH
PB2096-1 SPEAKER SELECTOR
LOUD-NESS
MAIN SPKRS
REMOTE SPKRS
TS801 HI TEMP. CIRCUIT BREAKER (MOUNTED ON P2175-2 HEAT SINK) SM851245
PB2201-1 MODE/MONITOR
TAPE MON
MONO MODE
AUTOSCAN PB2082-1
ONE STATION ADVANCE
AUTOSCAN MODE
CONTINUOUS ADVANCE
REMOTE CONTROL RK-40 PX1694-9
PB2084-1
J50A860
PB2099-1 SELECTOR
AFC OFF
FM LOCAL
MUTING OFF
M2 AUTOSCAN METER MC21610
I2 AUTOSCAN LAMP AS21410-6
DIAL LAMPS 1218406-1
TUNING METER LAMP PART OF M21C604-2
R11A,B FM TUNING POT. RTS0C180-245 USED WITH C21C003 or PART OF AS21009
MANUAL TUNING
I1 STEREO BEACON PART OF M21C604-2
M1 TUNING METER M21C604-1
T1 TD4007-115
POWER CONSUMPTION MIN. 20W 30 VA MAX. 240W 320 VA FOR RATED POWER 8 OHM LOAD
120 VAC 50-60 Hz
LINE CORD W50023-1
R12 820K 1/2 W
250W MAX
F1 3.2A T SLO-BLO
FUSEPOST X1980
RECEPTACLE ** J546-129
S1A,B POWER SWITCH PART OF R225A,B (ON 2095 BOARD)
Q961 TR1000 8XB
Q962 TR1057-1
PB2086-1,-5 † POWER SUPPLY
REAR (CODE LETTERS)
P4007 450T AW2867

SELECTOR (S3) SWITCH POSITIONS	
1	PHONO
2	AM
3	FM
4	AUX 1
5	AUX 2

5mm X 20mm FUSES
USED IN EXPORT POWER SUPPLY

FUSE	LITTELFUSE NUMBER	FR PART NUMBER
F951 F952	213008	FS18247-23
F953	213.500	FS18247-10
F954	21302.5	FS18247-19
F1	220V — 240V 213016	FS18247-17
	120V NONE	FS18247-21

* MOUNTED ON POWER SUPPLY BOARD
† USED ON EXPORT UNITS ONLY
** NOT USED ON EXPORT UNITS

NOTES:

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2. ALL SWITCHES SHOWN IN NORMAL OPERATING POSITIONS, VOLUME CONTROL MAXIMUM.
3. LINE VOLTAGE SET TO 120VAC FOR ALL DC VOLTAGE MEASUREMENTS. DC VOLTAGES MEASURED WITH DC VTVM TO CHASSIS WITH NO SIGNAL INPUT. ALL VOLTAGES AND CURRENTS ±15%, EXCEPT AS NOTED.
4. ☐ INDICATES 1kHz SIGNAL LEVELS BETWEEN INPUTS AND POWER AMPLIFIER OUTPUT, MEASURED WITH AC VTVM, AM GENERATOR SIGNAL = 1MHz, 10mV, 18% MODULATION; FM GENERATOR MONO SIGNAL =100MHz, 1mV, ±1kHz DEVIATION.